

```
In [1]: !nvidia-smi
```

```
Sun Mar 30 09:06:16 2025
+-----+
| NVIDIA-SMI 535.183.01      Driver Version: 535.183.01    CUDA Versio
n: 12.2      |
+-----+
| GPU  Name                  Persistence-M | Bus-Id      Disp.A | Volatile
Uncorr. ECC |
| Fan  Temp     Perf          Pwr:Usage/Cap |           Memory-Usage | GPU-Util
Compute M.   |
|          |                               |               |           |
MIG M.   |
+=====+
=====
|   0  NVIDIA GeForce RTX 3050 ...    Off  | 00000000:01:00.0 Off  |
N/A |
| N/A   56C     P8              3W /  60W |    10MiB / 4096MiB |      0%
Default |
|          |                               |               |           |
N/A |
+-----+
-----+
| Processes:
|
| GPU  GI  CI      PID  Type  Process name
GPU Memory |
|     ID  ID
Usage       |
+=====+
=====
|   0  N/A  N/A      3503    G    /usr/lib/xorg/Xorg
4MiB |
+-----+
-----+
```

```
In [ ]: # !kill 64232
```

```
In [3]: !pip install transformers datasets torch torchvision evaluate jiwer --break-
```

```
Defaulting to user installation because normal site-packages is not writeable
Collecting transformers
  Downloading transformers-4.50.1-py3-none-any.whl.metadata (39 kB)
Collecting datasets
  Using cached datasets-3.4.1-py3-none-any.whl.metadata (19 kB)
Requirement already satisfied: torch in /home/sharvesh/.local/lib/python3.1
2/site-packages (2.5.1)
Requirement already satisfied: torchvision in /home/sharvesh/.local/lib/pyth
on3.12/site-packages (0.20.1)
Collecting evaluate
  Using cached evaluate-0.4.3-py3-none-any.whl.metadata (9.2 kB)
Collecting jiwer
  Using cached jiwer-3.1.0-py3-none-any.whl.metadata (2.6 kB)
Requirement already satisfied: filelock in /home/sharvesh/.local/lib/python
3.12/site-packages (from transformers) (3.16.1)
Collecting huggingface-hub<1.0,>=0.26.0 (from transformers)
  Using cached huggingface_hub-0.29.3-py3-none-any.whl.metadata (13 kB)
Requirement already satisfied: numpy>=1.17 in /usr/lib/python3/dist-packages
(from transformers) (1.26.4)
Requirement already satisfied: packaging>=20.0 in /usr/lib/python3/dist-pack
ages (from transformers) (24.0)
Requirement already satisfied: pyyaml>=5.1 in /usr/lib/python3/dist-packages
(from transformers) (6.0.1)
Collecting regex!=2019.12.17 (from transformers)
  Downloading regex-2024.11.6-cp312-cp312-manylinux_2_17_x86_64.manylinux201
4_x86_64.whl.metadata (40 kB)
 40.5/40.5 kB 1.1 MB/s eta 0:0
0:004 MB/s eta 0:00:01
Requirement already satisfied: requests in /usr/lib/python3/dist-packages (f
rom transformers) (2.31.0)
Collecting tokenizers<0.22,>=0.21 (from transformers)
  Using cached tokenizers-0.21.1-cp39-abi3-manylinux_2_17_x86_64.manylinux20
14_x86_64.whl.metadata (6.8 kB)
Collecting safetensors>=0.4.3 (from transformers)
  Using cached safetensors-0.5.3-cp38-abi3-manylinux_2_17_x86_64.manylinux20
14_x86_64.whl.metadata (3.8 kB)
Requirement already satisfied: tqdm>=4.27 in /home/sharvesh/.local/lib/pytho
n3.12/site-packages (from transformers) (4.67.1)
Requirement already satisfied: pyarrow>=15.0.0 in /home/sharvesh/.local/lib/
python3.12/site-packages (from datasets) (18.1.0)
Collecting dill<0.3.9,>=0.3.0 (from datasets)
  Downloading dill-0.3.8-py3-none-any.whl.metadata (10 kB)
Requirement already satisfied: pandas in /home/sharvesh/.local/lib/python3.1
2/site-packages (from datasets) (2.2.3)
Collecting requests (from transformers)
  Downloading requests-2.32.3-py3-none-any.whl.metadata (4.6 kB)
Collecting xxhash (from datasets)
  Using cached xxhash-3.5.0-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_
x86_64.whl.metadata (12 kB)
Collecting multiprocess<0.70.17 (from datasets)
  Using cached multiprocess-0.70.16-py312-none-any.whl.metadata (7.2 kB)
Requirement already satisfied: fsspec<=2024.12.0,>=2023.1.0 in /home/sharves
h/.local/lib/python3.12/site-packages (from fsspec[http]<=2024.12.0,>=2023.
1.0->datasets) (2024.10.0)
Collecting aiohttp (from datasets)
```

```
    Downloading aiohttp-3.11.14-cp312-cp312-manylinux_2_17_x86_64.manylinux201
4_x86_64.whl.metadata (7.7 kB)
Requirement already satisfied: typing-extensions>=4.8.0 in /home/sharvesh/.l
ocal/lib/python3.12/site-packages (from torch) (4.12.2)
Requirement already satisfied: networkx in /home/sharvesh/.local/lib/python
3.12/site-packages (from torch) (3.4.2)
Requirement already satisfied: jinja2 in /usr/lib/python3/dist-packages (fro
m torch) (3.1.2)
Requirement already satisfied: nvidia-cuda-nvrtc-cu12==12.4.127 in /home/sha
rvesh/.local/lib/python3.12/site-packages (from torch) (12.4.127)
Requirement already satisfied: nvidia-cuda-runtime-cu12==12.4.127 in /home/s
harvesh/.local/lib/python3.12/site-packages (from torch) (12.4.127)
Requirement already satisfied: nvidia-cuda-cupti-cu12==12.4.127 in /home/sha
rvesh/.local/lib/python3.12/site-packages (from torch) (12.4.127)
Requirement already satisfied: nvidia-cudnn-cu12==9.1.0.70 in /home/sharves
h/.local/lib/python3.12/site-packages (from torch) (9.1.0.70)
Requirement already satisfied: nvidia-cublas-cu12==12.4.5.8 in /home/sharves
h/.local/lib/python3.12/site-packages (from torch) (12.4.5.8)
Requirement already satisfied: nvidia-cufft-cu12==11.2.1.3 in /home/sharves
h/.local/lib/python3.12/site-packages (from torch) (11.2.1.3)
Requirement already satisfied: nvidia-curand-cu12==10.3.5.147 in /home/sharv
esh/.local/lib/python3.12/site-packages (from torch) (10.3.5.147)
Requirement already satisfied: nvidia-cusolver-cu12==11.6.1.9 in /home/sharv
esh/.local/lib/python3.12/site-packages (from torch) (11.6.1.9)
Requirement already satisfied: nvidia-cusparse-cu12==12.3.1.170 in /home/sha
rvesh/.local/lib/python3.12/site-packages (from torch) (12.3.1.170)
Requirement already satisfied: nvidia-nccl-cu12==2.21.5 in /home/sharvesh/.l
ocal/lib/python3.12/site-packages (from torch) (2.21.5)
Requirement already satisfied: nvidia-nvtx-cu12==12.4.127 in /home/sharves
h/.local/lib/python3.12/site-packages (from torch) (12.4.127)
Requirement already satisfied: nvidia-nvjitlink-cu12==12.4.127 in /home/sharv
esh/.local/lib/python3.12/site-packages (from torch) (12.4.127)
Requirement already satisfied: triton==3.1.0 in /home/sharvesh/.local/lib/py
thon3.12/site-packages (from torch) (3.1.0)
Requirement already satisfied: setuptools in /usr/lib/python3/dist-packages
(from torch) (68.1.2)
Requirement already satisfied: sympy==1.13.1 in /home/sharvesh/.local/lib/py
thon3.12/site-packages (from torch) (1.13.1)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /home/sharvesh/.local/l
ib/python3.12/site-packages (from sympy==1.13.1->torch) (1.3.0)
Requirement already satisfied: pillow!=8.3.*,>=5.3.0 in /usr/lib/python3/dis
t-packages (from torchvision) (10.2.0)
Collecting click>=8.1.8 (from jiwer)
    Using cached click-8.1.8-py3-none-any.whl.metadata (2.3 kB)
Collecting rapidfuzz>=3.9.7 (from jiwer)
    Using cached rapidfuzz-3.12.2-cp312-cp312-manylinux_2_17_x86_64.manylinux2
014_x86_64.whl.metadata (12 kB)
Collecting aiohappyeyeballs>=2.3.0 (from aiohttp->datasets)
    Downloading aiohappyeyeballs-2.6.1-py3-none-any.whl.metadata (5.9 kB)
Collecting aiosignal>=1.1.2 (from aiohttp->datasets)
    Using cached aiosignal-1.3.2-py2.py3-none-any.whl.metadata (3.8 kB)
Requirement already satisfied: attrs>=17.3.0 in /usr/lib/python3/dist-packag
es (from aiohttp->datasets) (23.2.0)
Collecting frozenlist>=1.1.1 (from aiohttp->datasets)
    Using cached frozenlist-1.5.0-cp312-cp312-manylinux_2_5_x86_64.manylinux1_
x86_64.manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (13 kB)
```

```
Collecting multidict<7.0,>=4.5 (from aiohttp->datasets)
  Downloading multidict-6.2.0-cp312-cp312-manylinux_2_17_x86_64.manylinux201
4_x86_64.whl.metadata (4.9 kB)
Collecting propcache>=0.2.0 (from aiohttp->datasets)
  Downloading propcache-0.3.1-cp312-cp312-manylinux_2_17_x86_64.manylinux201
4_x86_64.whl.metadata (10 kB)
Collecting yarl<2.0,>=1.17.0 (from aiohttp->datasets)
  Using cached yarl-1.18.3-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x
86_64.whl.metadata (69 kB)
Collecting charset-normalizer<4,>=2 (from requests->transformers)
  Downloading charset_normalizer-3.4.1-cp312-cp312-manylinux_2_17_x86_64.man
ylinux2014_x86_64.whl.metadata (35 kB)
Requirement already satisfied: idna<4,>=2.5 in /usr/lib/python3/dist-pa
ckages (from requests->transformers) (3.6)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/lib/python3/dist-pa
ckages (from requests->transformers) (2.0.7)
Requirement already satisfied: certifi>=2017.4.17 in /usr/lib/python3/dist-pa
ckages (from requests->transformers) (2023.11.17)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/lib/python3/dist-pa
ckages (from pandas->datasets) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/lib/python3/dist-pa
ckages (from pandas->datasets) (2024.1)
Requirement already satisfied: tzdata>=2022.7 in /home/sharvesh/.local/lib/p
ython3.12/site-packages (from pandas->datasets) (2024.2)
Downloading transformers-4.50.1-py3-none-any.whl (10.2 MB)
    10.2/10.2 MB 3.3 MB/s eta 0:00:0
0m eta 0:00:01[36m0:00:01
Using cached datasets-3.4.1-py3-none-any.whl (487 kB)
Using cached evaluate-0.4.3-py3-none-any.whl (84 kB)
Using cached jiwer-3.1.0-py3-none-any.whl (22 kB)
Using cached click-8.1.8-py3-none-any.whl (98 kB)
Downloading dill-0.3.8-py3-none-any.whl (116 kB)
    116.3/116.3 kB 2.9 MB/s eta 0:0
0:00[31m4.6 MB/s eta 0:00:01
Downloading aiohttp-3.11.14-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x
86_64.whl (1.7 MB)
    1.7/1.7 MB 1.9 MB/s eta 0:00:00m
eta 0:00:01[36m0:00:01
Using cached huggingface_hub-0.29.3-py3-none-any.whl (468 kB)
Using cached multiprocess-0.70.16-py312-none-any.whl (146 kB)
Using cached rapidfuzz-3.12.2-cp312-cp312-manylinux_2_17_x86_64.manylinux201
4_x86_64.whl (3.1 MB)
Downloading regex-2024.11.6-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x
86_64.whl (796 kB)
    796.9/796.9 kB 2.8 MB/s eta 0:0
0:00[31m3.0 MB/s eta 0:00:01
Downloading requests-2.32.3-py3-none-any.whl (64 kB)
    64.9/64.9 kB 4.0 MB/s eta 0:00:0
0
Using cached safetensors-0.5.3-cp38-abi3-manylinux_2_17_x86_64.manylinux2014_x
86_64.whl (471 kB)
Using cached tokenizers-0.21.1-cp39-abi3-manylinux_2_17_x86_64.manylinux2014_x
86_64.whl (3.0 MB)
Using cached xxhash-3.5.0-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x8
6_64.whl (194 kB)
Downloading aiohappyeyeballs-2.6.1-py3-none-any.whl (15 kB)
```

```
Using cached aiosignal-1.3.2-py2.py3-none-any.whl (7.6 kB)
Downloading charset_normalizer-3.4.1-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (145 kB) 145.3/145.3 kB 2.3 MB/s eta 0:0
0:0031m7.5 MB/s eta 0:00:01
Using cached frozenlist-1.5.0-cp312-cp312-manylinux_2_5_x86_64.manylinux1_x86_64.manylinux_2_17_x86_64.manylinux2014_x86_64.whl (283 kB)
Downloading multidict-6.2.0-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (132 kB) 132.9/132.9 kB 1.7 MB/s eta 0:0
0:00[31m1.9 MB/s eta 0:00:01
Downloading propcache-0.3.1-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (245 kB) 245.0/245.0 kB 1.5 MB/s eta 0:0
0:00 MB/s eta 0:00:01:01
Using cached yarl-1.18.3-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (336 kB)
Installing collected packages: xxhash, safetensors, regex, rapidfuzz, propcache, multidict, frozenlist, dill, click, charset-normalizer, aiohappyeyeballs, yarl, requests, multiprocess, jiwer, aiosignal, huggingface-hub, aiohttp, tokenizers, transformers, datasets, evaluate
Successfully installed aiohappyeyeballs-2.6.1 aiohttp-3.11.14 aiosignal-1.3.2 charset-normalizer-3.4.1 click-8.1.8 datasets-3.4.1 dill-0.3.8 evaluate-0.4.3 frozenlist-1.5.0 huggingface-hub-0.29.3 jiwer-3.1.0 multidict-6.2.0 multiprocess-0.70.16 propcache-0.3.1 rapidfuzz-3.12.2 regex-2024.11.6 requests-2.32.3 safetensors-0.5.3 tokenizers-0.21.1 transformers-4.50.1 xxhash-3.5.0 yarl-1.18.3
```

```
In [34]: %matplotlib inline
from IPython.display import display, clear_output
```

```
In [5]: pip install tf-keras --break-system-packages
```

```
Defaulting to user installation because normal site-packages is not writeable
Collecting tf-keras
  Using cached tf_keras-2.19.0-py3-none-any.whl.metadata (1.8 kB)
Collecting tensorflow<2.20,>=2.19 (from tf-keras)
  Using cached tensorflow-2.19.0-cp312-cp312-manylinux_2_17_x86_64.manylinux
2014_x86_64.whl.metadata (4.1 kB)
Requirement already satisfied: absl-py>=1.0.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (2.1.0)
Requirement already satisfied: astunparse>=1.6.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (1.6.3)
Requirement already satisfied: flatbuffers>=24.3.25 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (24.3.25)
Requirement already satisfied: gast!=0.5.0,!0.5.1,!0.5.2,>0.2.1 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (0.6.0)
Requirement already satisfied: google-pasta>=0.1.1 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (0.2.0)
Requirement already satisfied: libclang>=13.0.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (18.1.1)
Requirement already satisfied: opt-einsum>=2.3.2 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (3.4.0)
Requirement already satisfied: packaging in /usr/lib/python3/dist-packages (from tensorflow<2.20,>=2.19->tf-keras) (24.0)
Requirement already satisfied: protobuf!=4.21.0,!4.21.1,!4.21.2,!4.21.3,!4.21.4,!4.21.5,<6.0.0dev,>=3.20.3 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (5.29.1)
Requirement already satisfied: requests<3,>=2.21.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (2.32.3)
Requirement already satisfied: setuptools in /usr/lib/python3/dist-packages (from tensorflow<2.20,>=2.19->tf-keras) (68.1.2)
Requirement already satisfied: six>=1.12.0 in /usr/lib/python3/dist-packages (from tensorflow<2.20,>=2.19->tf-keras) (1.16.0)
Requirement already satisfied: termcolor>=1.1.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (2.5.0)
Requirement already satisfied: typing-extensions>=3.6.6 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (4.12.2)
Requirement already satisfied: wrapt>=1.11.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (1.17.0)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (1.68.1)
Collecting tensorboard~=2.19.0 (from tensorflow<2.20,>=2.19->tf-keras)
  Using cached tensorboard-2.19.0-py3-none-any.whl.metadata (1.8 kB)
Requirement already satisfied: keras>=3.5.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (3.7.0)
Requirement already satisfied: numpy<2.2.0,>=1.26.0 in /usr/lib/python3/dist-packages (from tensorflow<2.20,>=2.19->tf-keras) (1.26.4)
Requirement already satisfied: h5py>=3.11.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorflow<2.20,>=2.19->tf-keras) (3.12.1)
Collecting ml-dtypes<1.0.0,>=0.5.1 (from tensorflow<2.20,>=2.19->tf-keras)
  Using cached ml_dtypes-0.5.1-cp312-cp312-manylinux_2_17_x86_64.manylinux20
14_x86_64.whl.metadata (21 kB)
```

```
Requirement already satisfied: wheel<1.0,>=0.23.0 in /usr/lib/python3/dist-packages (from astunparse>=1.6.0->tensorflow<2.20,>=2.19->tf-keras) (0.42.0)
Requirement already satisfied: rich in /usr/lib/python3/dist-packages (from keras>=3.5.0->tensorflow<2.20,>=2.19->tf-keras) (13.7.1)
Requirement already satisfied: namex in /home/sharvesh/.local/lib/python3.12/site-packages (from keras>=3.5.0->tensorflow<2.20,>=2.19->tf-keras) (0.0.8)
Requirement already satisfied: optree in /home/sharvesh/.local/lib/python3.12/site-packages (from keras>=3.5.0->tensorflow<2.20,>=2.19->tf-keras) (0.13.1)
Requirement already satisfied: charset-normalizer<4,>=2 in /home/sharvesh/.local/lib/python3.12/site-packages (from requests<3,>=2.21.0->tensorflow<2.20,>=2.19->tf-keras) (3.4.1)
Requirement already satisfied: idna<4,>=2.5 in /usr/lib/python3/dist-packages (from requests<3,>=2.21.0->tensorflow<2.20,>=2.19->tf-keras) (3.6)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/lib/python3/dist-packages (from requests<3,>=2.21.0->tensorflow<2.20,>=2.19->tf-keras) (2.0.7)
Requirement already satisfied: certifi>=2017.4.17 in /usr/lib/python3/dist-packages (from requests<3,>=2.21.0->tensorflow<2.20,>=2.19->tf-keras) (2023.1.17)
Requirement already satisfied: markdown>=2.6.8 in /usr/lib/python3/dist-packages (from tensorboard~2.19.0->tensorflow<2.20,>=2.19->tf-keras) (3.5.2)
Requirement already satisfied: tensorboard-data-server<0.8.0,>=0.7.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorboard~2.19.0->tensorflow<2.20,>=2.19->tf-keras) (0.7.2)
Requirement already satisfied: werkzeug>=1.0.1 in /home/sharvesh/.local/lib/python3.12/site-packages (from tensorboard~2.19.0->tensorflow<2.20,>=2.19->tf-keras) (3.1.3)
Requirement already satisfied: MarkupSafe>=2.1.1 in /usr/lib/python3/dist-packages (from werkzeug>=1.0.1->tensorboard~2.19.0->tensorflow<2.20,>=2.19->tf-keras) (2.1.5)
Requirement already satisfied: markdown-it-py>=2.2.0 in /usr/lib/python3/dist-packages (from rich->keras>=3.5.0->tensorflow<2.20,>=2.19->tf-keras) (3.0.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in /usr/lib/python3/dist-packages (from rich->keras>=3.5.0->tensorflow<2.20,>=2.19->tf-keras) (2.17.2)
Requirement already satisfied: mdurl~0.1 in /usr/lib/python3/dist-packages (from markdown-it-py>=2.2.0->rich->keras>=3.5.0->tensorflow<2.20,>=2.19->tf-keras) (0.1.2)
Using cached tf_keras-2.19.0-py3-none-any.whl (1.7 MB)
Using cached tensorflow-2.19.0-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (645.0 MB)
Using cached ml_dtypes-0.5.1-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (4.7 MB)
Using cached tensorboard-2.19.0-py3-none-any.whl (5.5 MB)
Installing collected packages: ml-dtypes, tensorboard, tensorflow, tf-keras
Successfully installed ml-dtypes-0.5.1 tensorboard-2.19.0 tensorflow-2.19.0 tf-keras-2.19.0
Note: you may need to restart the kernel to use updated packages.
```

```
In [4]: pip install accelerate==0.26.0 --break-system-packages
```

```
Defaulting to user installation because normal site-packages is not writeable
Collecting accelerate==0.26.0
  Using cached accelerate-0.26.0-py3-none-any.whl.metadata (18 kB)
Requirement already satisfied: numpy>=1.17 in /usr/lib/python3/dist-packages
  (from accelerate==0.26.0) (1.26.4)
Requirement already satisfied: packaging>=20.0 in /usr/lib/python3/dist-packages
  (from accelerate==0.26.0) (24.0)
Requirement already satisfied: psutil in /usr/lib/python3/dist-packages (from
accelerate==0.26.0) (5.9.8)
Requirement already satisfied: pyyaml in /usr/lib/python3/dist-packages (from
accelerate==0.26.0) (6.0.1)
Requirement already satisfied: torch>=1.10.0 in /home/sharvesh/.local/lib/py
thon3.12/site-packages (from accelerate==0.26.0) (2.5.1)
Requirement already satisfied: huggingface-hub in /home/sharvesh/.local/lib/
python3.12/site-packages (from accelerate==0.26.0) (0.29.3)
Requirement already satisfied: safetensors>=0.3.1 in /home/sharvesh/.local/l
ib/python3.12/site-packages (from accelerate==0.26.0) (0.5.3)
Requirement already satisfied: filelock in /home/sharvesh/.local/lib/python
3.12/site-packages (from torch>=1.10.0->accelerate==0.26.0) (3.16.1)
Requirement already satisfied: typing-extensions>=4.8.0 in /home/sharvesh/.l
ocal/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.0)
(4.12.2)
Requirement already satisfied: networkx in /home/sharvesh/.local/lib/python
3.12/site-packages (from torch>=1.10.0->accelerate==0.26.0) (3.4.2)
Requirement already satisfied: jinja2 in /usr/lib/python3/dist-packages (fro
m torch>=1.10.0->accelerate==0.26.0) (3.1.2)
Requirement already satisfied: fsspec in /home/sharvesh/.local/lib/python3.1
2/site-packages (from torch>=1.10.0->accelerate==0.26.0) (2024.10.0)
Requirement already satisfied: nvidia-cuda-nvrtc-cu12==12.4.127 in /home/sha
rvesh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==
0.26.0) (12.4.127)
Requirement already satisfied: nvidia-cuda-runtime-cu12==12.4.127 in /home/s
harvesh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate=
=0.26.0) (12.4.127)
Requirement already satisfied: nvidia-cuda-cupti-cu12==12.4.127 in /home/sha
rvesh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==
0.26.0) (12.4.127)
Requirement already satisfied: nvidia-cudnn-cu12==9.1.0.70 in /home/sharves
h/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.
0) (9.1.0.70)
Requirement already satisfied: nvidia-cublas-cu12==12.4.5.8 in /home/sharves
h/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.
0) (12.4.5.8)
Requirement already satisfied: nvidia-cufft-cu12==11.2.1.3 in /home/sharves
h/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.
0) (11.2.1.3)
Requirement already satisfied: nvidia-curand-cu12==10.3.5.147 in /home/sharve
sh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.2
6.0) (10.3.5.147)
Requirement already satisfied: nvidia-cusolver-cu12==11.6.1.9 in /home/sharve
sh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.2
6.0) (11.6.1.9)
Requirement already satisfied: nvidia-cusparse-cu12==12.3.1.170 in /home/sharve
sh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.
0) (12.3.1.170)
```

```
Requirement already satisfied: nvidia-nccl-cu12==2.21.5 in /home/sharvesh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.0) (2.21.5)
Requirement already satisfied: nvidia-nvtx-cu12==12.4.127 in /home/sharvesh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.0) (12.4.127)
Requirement already satisfied: nvidia-nvjitlink-cu12==12.4.127 in /home/sharvesh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.0) (12.4.127)
Requirement already satisfied: triton==3.1.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.0) (3.1.0)
Requirement already satisfied: setuptools in /usr/lib/python3/dist-packages (from torch>=1.10.0->accelerate==0.26.0) (68.1.2)
Requirement already satisfied: sympy==1.13.1 in /home/sharvesh/.local/lib/python3.12/site-packages (from torch>=1.10.0->accelerate==0.26.0) (1.13.1)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from sympy==1.13.1->torch>=1.10.0->accelerate==0.26.0) (1.3.0)
Requirement already satisfied: requests in /home/sharvesh/.local/lib/python3.12/site-packages (from huggingface-hub->accelerate==0.26.0) (2.32.3)
Requirement already satisfied: tqdm>=4.42.1 in /home/sharvesh/.local/lib/python3.12/site-packages (from huggingface-hub->accelerate==0.26.0) (4.67.1)
Requirement already satisfied: charset-normalizer<4,>=2 in /home/sharvesh/.local/lib/python3.12/site-packages (from requests->huggingface-hub->accelerate==0.26.0) (3.4.1)
Requirement already satisfied: idna<4,>=2.5 in /usr/lib/python3/dist-packages (from requests->huggingface-hub->accelerate==0.26.0) (3.6)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/lib/python3/dist-packages (from requests->huggingface-hub->accelerate==0.26.0) (2.0.7)
Requirement already satisfied: certifi>=2017.4.17 in /usr/lib/python3/dist-packages (from requests->huggingface-hub->accelerate==0.26.0) (2023.11.17)
Using cached accelerate-0.26.0-py3-none-any.whl (270 kB)
Installing collected packages: accelerate
Successfully installed accelerate-0.26.0
Note: you may need to restart the kernel to use updated packages.
```

```
In [2]: !pip install ipywidgets --break-system-packages
```

```
Defaulting to user installation because normal site-packages is not writeable
Collecting ipywidgets
  Downloading ipywidgets-8.1.5-py3-none-any.whl.metadata (2.3 kB)
Requirement already satisfied: comm>=0.1.3 in /home/sharvesh/.local/lib/python3.12/site-packages (from ipywidgets) (0.2.2)
Requirement already satisfied: ipython>=6.1.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from ipywidgets) (9.0.2)
Requirement already satisfied: traitlets>=4.3.1 in /home/sharvesh/.local/lib/python3.12/site-packages (from ipywidgets) (5.14.3)
Collecting widgetsnbextension~=4.0.12 (from ipywidgets)
  Downloading widgetsnbextension-4.0.13-py3-none-any.whl.metadata (1.6 kB)
Collecting jupyterlab-widgets~=3.0.12 (from ipywidgets)
  Downloading jupyterlab_widgets-3.0.13-py3-none-any.whl.metadata (4.1 kB)
Requirement already satisfied: decorator in /usr/lib/python3/dist-packages (from ipython>=6.1.0->ipywidgets) (5.1.1)
Requirement already satisfied: ipython-pygments-lexers in /home/sharvesh/.local/lib/python3.12/site-packages (from ipython>=6.1.0->ipywidgets) (1.1.1)
Requirement already satisfied: jedi>=0.16 in /home/sharvesh/.local/lib/python3.12/site-packages (from ipython>=6.1.0->ipywidgets) (0.19.2)
Requirement already satisfied: matplotlib-inline in /home/sharvesh/.local/lib/python3.12/site-packages (from ipython>=6.1.0->ipywidgets) (0.1.7)
Requirement already satisfied: pexpect>4.3 in /usr/lib/python3/dist-packages (from ipython>=6.1.0->ipywidgets) (4.9.0)
Requirement already satisfied: prompt_toolkit<3.1.0,>=3.0.41 in /home/sharvesh/.local/lib/python3.12/site-packages (from ipython>=6.1.0->ipywidgets) (3.0.50)
Requirement already satisfied: pygments>=2.4.0 in /usr/lib/python3/dist-packages (from ipython>=6.1.0->ipywidgets) (2.17.2)
Requirement already satisfied: stack_data in /home/sharvesh/.local/lib/python3.12/site-packages (from ipython>=6.1.0->ipywidgets) (0.6.3)
Requirement already satisfied: parso<0.9.0,>=0.8.4 in /home/sharvesh/.local/lib/python3.12/site-packages (from jedi>=0.16->ipython>=6.1.0->ipywidgets) (0.8.4)
Requirement already satisfied: wcwidth in /home/sharvesh/.local/lib/python3.12/site-packages (from prompt_toolkit<3.1.0,>=3.0.41->ipython>=6.1.0->ipywidgets) (0.2.13)
Requirement already satisfied: executing>=1.2.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from stack_data->ipython>=6.1.0->ipywidgets) (2.2.0)
Requirement already satisfied: asttokens>=2.1.0 in /home/sharvesh/.local/lib/python3.12/site-packages (from stack_data->ipython>=6.1.0->ipywidgets) (3.0.0)
Requirement already satisfied: pure-eval in /home/sharvesh/.local/lib/python3.12/site-packages (from stack_data->ipython>=6.1.0->ipywidgets) (0.2.3)
Downloading ipywidgets-8.1.5-py3-none-any.whl (139 kB)
  139.8/139.8 kB 2.0 MB/s eta 0:00:00
0:00:31m 2.1 MB/s eta 0:00:01
Downloading jupyterlab_widgets-3.0.13-py3-none-any.whl (214 kB)
  214.4/214.4 kB 7.1 MB/s eta 0:00:00
0:00:00
Downloading widgetsnbextension-4.0.13-py3-none-any.whl (2.3 MB)
  2.3/2.3 MB 3.8 MB/s eta 0:00:00m
eta 0:00:01[36m0:00:01
Installing collected packages: widgetsnbextension, jupyterlab-widgets, ipywidgets
```

```
Successfully installed ipywidgets-8.1.5 jupyterlab-widgets-3.0.13 widgetsnbe  
xtension-4.0.13
```

```
In [1]: import pandas as pd  
import albumentations as A  
import torch  
from torch.utils.data import Dataset, DataLoader, random_split  
from transformers import TrOCRProcessor, VisionEncoderDecoderModel, Trainer,  
from PIL import Image  
import numpy as np  
from torch.nn.utils.rnn import pad_sequence  
from torch.optim import AdamW  
from torch.optim.lr_scheduler import ReduceLROnPlateau  
import evaluate  
import os  
from IPython.display import display, clear_output  
os.environ["CUDA_VISIBLE_DEVICES"] = ""  
torch.set_default_device("cpu")
```

```
/home/sharvesh/.local/lib/python3.12/site-packages/albumnations/__init__.py:24: UserWarning: A new version of Albumnations is available: 2.0.5 (you have 1.4.21). Upgrade using: pip install -U albumnations. To disable automatic update checks, set the environment variable NO_ALBUMNATIONS_UPDATE to 1.
    check_for_updates()
2025-03-29 19:17:07.752189: I tensorflow/core/util/port.cc:153] oneDNN custom operations are on. You may see slightly different numerical results due to floating-point round-off errors from different computation orders. To turn them off, set the environment variable `TF_ENABLE_ONEDNN_OPTS=0`.
2025-03-29 19:17:07.926536: E external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:467] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1743256028.020747    8109 cuda_dnn.cc:8579] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered
E0000 00:00:1743256028.049748    8109 cuda_blas.cc:1407] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered
W0000 00:00:1743256028.184243    8109 computation_placer.cc:177] computation placer already registered. Please check linkage and avoid linking the same target more than once.
W0000 00:00:1743256028.184302    8109 computation_placer.cc:177] computation placer already registered. Please check linkage and avoid linking the same target more than once.
W0000 00:00:1743256028.184308    8109 computation_placer.cc:177] computation placer already registered. Please check linkage and avoid linking the same target more than once.
W0000 00:00:1743256028.184312    8109 computation_placer.cc:177] computation placer already registered. Please check linkage and avoid linking the same target more than once.
2025-03-29 19:17:08.204281: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.
To enable the following instructions: AVX2 AVX_VNNI FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
```

```
In [2]: # Load CER and WER metrics
cer_metric = evaluate.load("cer")
wer_metric = evaluate.load("wer")

# Define compute_metrics function for evaluation
def compute_metrics(eval_pred):
    logits, labels = eval_pred
    if isinstance(logits, tuple):
        logits = logits[0]
    predictions = logits.argmax(-1)
    decoded_preds = processor.tokenizer.batch_decode(predictions, skip_special_tokens=True)
    decoded_labels = []
    for label in labels:
        label_filtered = [token for token in label if token != -100]
        decoded_label = processor.tokenizer.decode(label_filtered, skip_special_tokens=True)
        decoded_labels.append(decoded_label)
    cer_score = cer_metric.compute(predictions=decoded_preds, references=decoded_labels)
    wer_score = wer_metric.compute(predictions=decoded_preds, references=decoded_labels)
    return {"cer": cer_score, "wer": wer_score}
```

```

wer_score = wer_metric.compute(predictions=decoded_preds, references=dec
return {"cer": cer_score, "wer": wer_score}

# Custom Dataset class for your line segment images and ground truth
class LineDataset(Dataset):
    def __init__(self, processor, model, line_images, texts, target_size=(25
        self.line_images = line_images # List of PIL Images or numpy arrays
        self.texts = texts # List of ground truth text strings
        self.processor = processor
        self.processor.image_processor.max_length = max_length
        self.processor.tokenizer.model_max_length = max_length
        self.model = model
        self.model.config.max_length = max_length
        self.target_size = target_size
        self.max_length = max_length
        self.apply_augmentation = apply_augmentation

        # Augmentations tailored to historical Spanish texts
        if apply_augmentation:
            self.transform = A.Compose([
                A.OneOf([
                    A.Rotate(limit=2, p=1.0), # Slight rotation for realism
                    A.GaussNoise(var_limit=(5.0, 10.0), p=1.0), # Noise for
                    A.GaussianBlur(blur_limit=(3, 5), p=1.0), # Faded text
                    A.RandomBrightnessContrast(brightness_limit=0.1, contras
                    A.OpticalDistortion(distort_limit=0.02, shift_limit=0.02
                ], p=0.8), # Apply augmentations with 80% probability
            ])
        else:
            self.transform = A.Compose([])

        print("Applied augmentation!")

    def __len__(self):
        return len(self.line_images)

    def __getitem__(self, idx):
        image = self.line_images[idx]
        text = self.texts[idx]

        # If image is a file path, load it; otherwise assume it's a PIL Image
        if isinstance(image, str):
            image = Image.open(image).convert("RGB")
        elif isinstance(image, np.ndarray):
            image = Image.fromarray(image).convert("RGB")

        # Convert to numpy array for augmentation
        image = np.array(image)

        # Apply augmentations
        if self.apply_augmentation:
            augmented = self.transform(image=image)
            image = augmented['image']

        # Resize image to target size
        image = Image.fromarray(image).resize(self.target_size, Image.BILINEAR)

```

```

        image = np.array(image) / 255.0 # Normalize to [0, 1]
        image = np.transpose(image, (2, 0, 1)) # Convert to (C, H, W)

        # Process image and text with TrOCR processor
        encoding = self.processor(images=image, text=text, return_tensors="pt")
        encoding['labels'] = encoding['labels'][:, :self.max_length] # Trim padding

    return {k: v.squeeze() for k, v in encoding.items()}

# Collate function for batching
def collate_fn(batch):
    pixel_values = torch.stack([item['pixel_values'] for item in batch])
    labels = pad_sequence([item['labels'] for item in batch], batch_first=True)
    return {'pixel_values': pixel_values, 'labels': labels}

# Training function
def train_transformer_model(line_images, texts, target_size=(256, 64), batch_size=8, val_split=0.1, max_length=512, no_repeat_ngram_size=3, generation_config=None, output_dir="/media/sharvesh/Expansion/Documents/model/results", num_train_epochs=10, per_device_train_batch_size=8, per_device_eval_batch_size=8, logging_dir="./logs", logging_steps=100, save_steps=100, save_total_limit=2, evaluation_strategy="steps", eval_steps=100, learning_rate=3e-5, weight_decay=0.01, load_best_model_at_end=True, metric_for_best_model="cer", greater_is_better=False, device="cpu", processor=None):
    print("Inside train transformer function!")
    device = torch.device("cpu")
    global processor

    # Load TrOCR processor and model
    processor = TrOCRProcessor.from_pretrained("qantev/trocr-large-spanish", cache_dir=output_dir)
    model = VisionEncoderDecoderModel.from_pretrained("qantev/trocr-large-spanish", cache_dir=output_dir)

    # Load or define generation config
    if generation_config is None:
        generation_config = GenerationConfig(max_length=max_length, no_repeat_ngram_size=no_repeat_ngram_size)

    # Create dataset
    dataset = LineDataset(processor, model, line_images, texts, target_size, max_length, generation_config)

    # Split into train and validation sets
    val_size = int(len(dataset) * val_split)
    train_size = len(dataset) - val_size
    train_dataset, val_dataset = random_split(dataset, [train_size, val_size])

    # Move model to device
    model = dataset.model.to(device)

    # Define training arguments
    training_args = TrainingArguments(
        output_dir=output_dir,
        num_train_epochs=num_train_epochs,
        per_device_train_batch_size=per_device_train_batch_size,
        per_device_eval_batch_size=per_device_eval_batch_size,
        logging_dir=logging_dir,
        logging_steps=logging_steps,
        save_steps=save_steps,
        save_total_limit=save_total_limit,
        evaluation_strategy=evaluation_strategy,
        eval_steps=eval_steps,
        learning_rate=learning_rate,
        weight_decay=weight_decay,
        load_best_model_at_end=load_best_model_at_end,
        metric_for_best_model=metric_for_best_model,
        greater_is_better=greater_is_better,
        device=device
    )

    # Train the model
    trainer = Trainer(
        model=model,
        args=training_args,
        train_dataset=train_dataset,
        eval_dataset=val_dataset,
        tokenizer=processor.tokenizer,
        data_collator=collate_fn
    )
    trainer.train()

```

```

        gradient_accumulation_steps=16, # Adjust based on GPU memory
        fp16=True, # Enable mixed precision training if supported
        use_cpu = True,
        logging_first_step=True
    )

    # Define optimizer and scheduler
    optimizer = AdamW(model.parameters(), lr=training_args.learning_rate, we
    scheduler = ReduceLROnPlateau(optimizer, mode='min', factor=0.1, patientc

    # Initialize trainer
    trainer = Trainer(
        model=model,
        args=training_args,
        train_dataset=train_dataset,
        eval_dataset=val_dataset,
        data_collator=collate_fn,
        optimizers=(optimizer, scheduler),
        callbacks=[EarlyStoppingCallback(early_stopping_patience=5)],
        compute_metrics=compute_metrics
    )

    # Train the model
    trainer.train()

    # Save the fine-tuned model and processor
    model.save_pretrained("/media/sharvesh/Expansion/Documents/model/finetur
    processor.save_pretrained("/media/sharvesh/Expansion/Documents/model/fir

    # Load your Excel file and prepare data
    excel_file = "/home/sharvesh/Documents/Others/Human_AI/Model/data/output/dat
    df = pd.read_csv(excel_file)

    # Assuming your Excel has columns 'image_path' (folder path to line segment
    line_images = df['image_path'].tolist() # List of file paths to line segmer
    texts = df['text'].tolist()          # List of corresponding ground truth texts

    # Train the model
    train_transformer_model(line_images, texts, target_size=(256, 64), batch_siz

```

Inside train transformer function!

Using a slow image processor as `use_fast` is unset and a slow processor was saved with this model. `use_fast=True` will be the default behavior in v4.5.0, even if the model was saved with a slow processor. This will result in minor differences in outputs. You'll still be able to use a slow processor with `use_fast=False`.

```
Config of the encoder: <class 'transformers.models.vit.modeling_vit.ViTModel'> is overwritten by shared encoder config: ViTConfig {
    "attention_probs_dropout_prob": 0.0,
    "encoder_stride": 16,
    "hidden_act": "gelu",
    "hidden_dropout_prob": 0.0,
    "hidden_size": 1024,
    "image_size": 384,
    "initializer_range": 0.02,
    "intermediate_size": 4096,
    "layer_norm_eps": 1e-12,
    "model_type": "vit",
    "num_attention_heads": 16,
    "num_channels": 3,
    "num_hidden_layers": 24,
    "patch_size": 16,
    "pooler_act": "tanh",
    "pooler_output_size": 1024,
    "qkv_bias": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1"
}
```

Config of the decoder: <class 'transformers.models.trocr.modeling_trocr.Tr0CRForCausalLM'> is overwritten by shared decoder config: Tr0CRConfig {

```
    "activation_dropout": 0.0,
    "activation_function": "relu",
    "add_cross_attention": true,
    "attention_dropout": 0.0,
    "bos_token_id": 0,
    "classifier_dropout": 0.0,
    "d_model": 1024,
    "decoder_attention_heads": 16,
    "decoder_ffn_dim": 4096,
    "decoder_layerdrop": 0.0,
    "decoder_layers": 12,
    "decoder_start_token_id": 2,
    "dropout": 0.1,
    "encoder_hidden_size": 1024,
    "eos_token_id": 2,
    "init_std": 0.02,
    "is_decoder": true,
    "layernorm_embedding": false,
    "max_position_embeddings": 1024,
    "model_type": "trocr",
    "pad_token_id": 1,
    "scale_embedding": true,
    "tie_word_embeddings": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1",
    "use_cache": false,
```

```
        "use_learned_position_embeddings": false,  
        "vocab_size": 50265  
    }  
  
Applied augmentation!
```

```
/home/sharvesh/.local/lib/python3.12/site-packages/transformers/training_arg  
s.py:1611: FutureWarning: `evaluation_strategy` is deprecated and will be re  
moved in version 4.46 of 🤗 Transformers. Use `eval_strategy` instead  
    warnings.warn(  
        '`loss_type=None` was set in the config but it is unrecognised. Using the defa  
ult loss: `ForCausalLMLoss`.  
[160/160 7:06:49, Epoch 9/10]
```

Step	Training Loss	Validation Loss	Cer	Wer
100	1.713700	1.564725	0.224238	0.512287

```
/home/sharvesh/.local/lib/python3.12/site-packages/transformers/modeling_uti  
ls.py:3353: UserWarning: Moving the following attributes in the config to th  
e generation config: {'max_length': 512, 'no_repeat_ngram_size': 3}. You are  
seeing this warning because you've set generation parameters in the model co  
nfig, as opposed to in the generation config.  
    warnings.warn(  
[160/160 7:06:49, Epoch 9/10]
```

```
In [ ]: import pandas as pd  
import albumentations as A  
import torch  
from torch.utils.data import Dataset, DataLoader, random_split  
from transformers import TrOCRProcessor, VisionEncoderDecoderModel, Trainer,  
from PIL import Image  
import numpy as np  
from torch.nn.utils.rnn import pad_sequence  
from torch.optim import AdamW  
from torch.optim.lr_scheduler import ReduceLROnPlateau  
import evaluate # Updated for metrics  
  
# Load CER and WER metrics  
cer_metric = evaluate.load("cer")  
wer_metric = evaluate.load("wer")  
  
# Define compute_metrics function  
def compute_metrics(eval_pred):  
    logits, labels = eval_pred  
    if isinstance(logits, tuple):  
        logits = logits[0]  
    predictions = logits.argmax(-1)  
    decoded_preds = processor.tokenizer.batch_decode(predictions, skip_special_tokens=True)  
    decoded_labels = []  
    for label in labels:  
        label_filtered = [token for token in label if token != -100]  
        decoded_label = processor.tokenizer.decode(label_filtered, skip_special_tokens=True)  
        decoded_labels.append(decoded_label)  
    cer_score = cer_metric.compute(predictions=decoded_preds, references=decoded_labels)  
    wer_score = wer_metric.compute(predictions=decoded_preds, references=decoded_labels)  
    return {"cer": cer_score, "wer": wer_score}
```

```

# Custom Dataset class (unchanged)
class LineDataset(Dataset):
    def __init__(self, processor, model, line_images, texts, target_size=(256, 256)):
        self.line_images = line_images
        self.texts = texts
        self.processor = processor
        self.processor.image_processor.max_length = max_length
        self.processor.tokenizer.model_max_length = max_length
        self.model = model
        self.model.config.max_length = max_length
        self.target_size = target_size
        self.max_length = max_length
        self.apply_augmentation = apply_augmentation
        if apply_augmentation:
            self.transform = A.Compose([
                A.OneOf([
                    A.Rotate(limit=2, p=1.0),
                    A.GaussNoise(var_limit=(5.0, 10.0), p=1.0),
                    A.GaussianBlur(blur_limit=(3, 5), p=1.0),
                    A.RandomBrightnessContrast(brightness_limit=0.1, contrast_limit=0.1, p=1.0),
                    A.OpticalDistortion(distort_limit=0.02, shift_limit=0.02, p=1.0)
                ], p=0.8),
            ])
        else:
            self.transform = A.Compose([])
        print("Applied augmentation!")

    def __len__(self):
        return len(self.line_images)

    def __getitem__(self, idx):
        image = self.line_images[idx]
        text = self.texts[idx]
        if isinstance(image, str):
            image = Image.open(image).convert("RGB")
        elif isinstance(image, np.ndarray):
            image = Image.fromarray(image).convert("RGB")
        image = np.array(image)
        if self.apply_augmentation:
            augmented = self.transform(image=image)
            image = augmented['image']
        image = Image.fromarray(image).resize(self.target_size, Image.BILINEAR)
        image = np.array(image) / 255.0
        image = np.transpose(image, (2, 0, 1))
        encoding = self.processor(images=image, text=text, return_tensors="pt")
        encoding['labels'] = encoding['labels'][:, :self.max_length]
        return {k: v.squeeze() for k, v in encoding.items()}

# Collate function
def collate_fn(batch):
    pixel_values = torch.stack([item['pixel_values'] for item in batch])
    labels = pad_sequence([item['labels'] for item in batch], batch_first=True)
    return {'pixel_values': pixel_values, 'labels': labels}

# Training function for the fine-tuned model
def continue_training_finetuned_model(line_images, texts, target_size=(256, 256)):
    dataset = LineDataset(processor=processor, model=model, line_images=line_images, texts=texts, target_size=target_size)
    dataloader = DataLoader(dataset, batch_size=8, collate_fn=collate_fn)
    optimizer = AdamW(model.parameters(), lr=2e-5)
    num_train_steps = int(len(dataset) / 8 * num_epochs)
    scheduler = get_linear_schedule_with_warmup(optimizer, num_warmup_steps=100, num_training_steps=num_train_steps)
    model.train()
    for epoch in range(num_epochs):
        for batch in dataloader:
            inputs = {key: value.to(device) for key, value in batch.items()}
            outputs = model(**inputs)
            loss = outputs.loss
            loss.backward()
            optimizer.step()
            scheduler.step()
            optimizer.zero_grad()
        print(f'Epoch {epoch+1}/{num_epochs}, Loss: {loss.item():.4f}')

```

```

print("Inside continue training function!")
device = torch.device("cpu") # Adjust to "cuda" if GPU available

# Load the fine-tuned model and processor
global processor
save_dir = "/media/sharvesh/Expansion/Documents/model/finetuned_trocr_sp"
processor = TrOCRProcessor.from_pretrained(save_dir, do_rescale=False)
model = VisionEncoderDecoderModel.from_pretrained(save_dir).to(device)

# Load or define generation config
generation_config = GenerationConfig(max_length=512, no_repeat_ngram_size=2)

# Create dataset (use same or new data)
dataset = LineDataset(processor, model, line_images, texts, target_size,
val_size = int(len(dataset) * val_split)
train_size = len(dataset) - val_size
train_dataset, val_dataset = random_split(dataset, [train_size, val_size])

print(f"Training dataset size: {len(train_dataset)}")
print(f"Validation dataset size: {len(val_dataset)}")

# Define training arguments for continued training
training_args = TrainingArguments(
    output_dir="/media/sharvesh/Expansion/Documents/model/results_continued",
    num_train_epochs=10, # Fewer epochs for additional training (adjust as needed)
    per_device_train_batch_size=batch_size,
    per_device_eval_batch_size=batch_size,
    logging_dir=".//logs_continued",
    logging_steps=20, # More frequent logging
    save_steps=100,
    save_total_limit=2,
    evaluation_strategy="steps",
    eval_steps=50,
    learning_rate=1e-5, # Lower learning rate for fine-tuning
    weight_decay=0.01,
    load_best_model_at_end=True,
    metric_for_best_model="cer",
    greater_is_better=False,
    gradient_accumulation_steps=16,
    fp16=False, # Set to True if using GPU with CUDA
    use_cpu=True, # Set to False if using GPU
    logging_first_step=True,
)

# Define optimizer and scheduler
optimizer = AdamW(model.parameters(), lr=training_args.learning_rate, weight_decay=0.01)
scheduler = ReduceLROnPlateau(optimizer, mode='min', factor=0.1, patience=3)

# Initialize trainer
trainer = Trainer(
    model=model,
    args=training_args,
    train_dataset=train_dataset,
    eval_dataset=val_dataset,
    data_collator=collate_fn,
    optimizers=(optimizer, scheduler),
)

```

```

        callbacks=[EarlyStoppingCallback(early_stopping_patience=5)],
        compute_metrics=compute_metrics
    )

    # Continue training
    trainer.train()

    # Save the updated fine-tuned model
    updated_save_dir = "/media/sharvesh/Expansion/Documents/model/finetuned_
os.makedirs(updated_save_dir, exist_ok=True)
    model.save_pretrained(updated_save_dir)
    processor.save_pretrained(updated_save_dir)
    print(f"Updated model saved to {updated_save_dir}")

    # Load your CSV file and prepare data
    csv_file = "/home/sharvesh/Documents/Others/Human_AI/Model/data/output/datas
df = pd.read_csv(csv_file)

    # Assuming columns 'image_path' and 'text' (updated from 'ground_truth')
    line_images = df['image_path'].tolist()
    texts = df['text'].tolist()

    # Continue training the fine-tuned model
    continue_training_finetuned_model(line_images, texts, target_size=(256, 64),

```

In [21]:

```

processor = TrOCRProcessor.from_pretrained("/media/sharvesh/Expansion/Docume
model = VisionEncoderDecoderModel.from_pretrained("/media/sharvesh/Expansion/
image = Image.open("/home/sharvesh/Documents/Others/Human_AI/Model/data/Cons
pixel_values = processor(image, return_tensors="pt").pixel_values.to("cpu")
generated_ids = model.generate(pixel_values)
text = processor.batch_decode(generated_ids, skip_special_tokens=True)[0]
print(f"Predicted text: {text}")

```

```
Config of the encoder: <class 'transformers.models.vit.modeling_vit.ViTModel'> is overwritten by shared encoder config: ViTConfig {
    "attention_probs_dropout_prob": 0.0,
    "encoder_stride": 16,
    "hidden_act": "gelu",
    "hidden_dropout_prob": 0.0,
    "hidden_size": 1024,
    "image_size": 384,
    "initializer_range": 0.02,
    "intermediate_size": 4096,
    "layer_norm_eps": 1e-12,
    "model_type": "vit",
    "num_attention_heads": 16,
    "num_channels": 3,
    "num_hidden_layers": 24,
    "patch_size": 16,
    "pooler_act": "tanh",
    "pooler_output_size": 1024,
    "qkv_bias": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1"
}

Config of the decoder: <class 'transformers.models.trocr.modeling_trocr.Tr0CRForCausalLM'> is overwritten by shared decoder config: Tr0CRCConfig {
    "activation_dropout": 0.0,
    "activation_function": "relu",
    "add_cross_attention": true,
    "attention_dropout": 0.0,
    "bos_token_id": 0,
    "classifier_dropout": 0.0,
    "d_model": 1024,
    "decoder_attention_heads": 16,
    "decoder_ffn_dim": 4096,
    "decoder_layerdrop": 0.0,
    "decoder_layers": 12,
    "decoder_start_token_id": 2,
    "dropout": 0.1,
    "encoder_hidden_size": 1024,
    "eos_token_id": 2,
    "init_std": 0.02,
    "is_decoder": true,
    "layernorm_embedding": false,
    "max_position_embeddings": 1024,
    "model_type": "trocr",
    "pad_token_id": 1,
    "scale_embedding": true,
    "tie_word_embeddings": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1",
    "use_cache": false,
    "use_learned_position_embeddings": false,
    "vocab_size": 50265
}
```

Predicted text: ['P']

```
In [ ]: import torch
from torch.utils.data import DataLoader
import matplotlib.pyplot as plt
from jiwer import cer, wer
from PIL import Image
import numpy as np
import os

# Function to evaluate the trained model
def evaluate_model(line_images, texts, target_size=(256, 64), batch_size=2):
    device = torch.device("cuda" if torch.cuda.is_available() else "cpu")

    # Define model and processor paths (update paths accordingly)
    model_path = "/media/sharvesh/Expansion/Documents/model/finetuned_trocr_
processor_path = model_path

    processor = TrOCRProcessor.from_pretrained(processor_path)
    model = VisionEncoderDecoderModel.from_pretrained(model_path).to(device)
    model.eval()

    dataset = LineDataset(processor, model, line_images, texts, target_size,
    dataloader = DataLoader(dataset, batch_size=batch_size, shuffle=False, c

    cer_scores = []
    wer_scores = []
    predictions = []

    with torch.no_grad():
        for batch in dataloader:
            pixel_values = batch["pixel_values"].to(device)
            generated_ids = model.generate(pixel_values)
            generated_texts = processor.tokenizer.batch_decode(generated_ids)

            for i, pred in enumerate(generated_texts):
                gt = texts[len(predictions)] # Ground truth

                # Compute CER and WER
                cer_scores.append(cer(gt, pred))
                wer_scores.append(wer(gt, pred))

            predictions.append(pred)

        # Display image and predictions
        image_path = line_images[len(predictions) - 1]
        if isinstance(image_path, str):
            image = Image.open(image_path).convert("L")
        else:
            image = Image.fromarray(image_path).convert("L")

        plt.figure(figsize=(8, 6))
        plt.imshow(image, cmap='gray')
        plt.title(f"Target: {gt}\nPrediction: {pred}")
        plt.axis('off')
        plt.show()
```

```
        print("=" * 50)

    # Compute average scores
    avg_cer = sum(cer_scores) / len(cer_scores) if cer_scores else 0
    avg_wer = sum(wer_scores) / len(wer_scores) if wer_scores else 0

    print(f"Average CER: {avg_cer:.4f}")
    print(f"Average WER: {avg_wer:.4f}")
    print("Evaluation completed.")

    # Print all predictions
    for i, pred in enumerate(predictions):
        print(f"{i+1}: {pred}")

# Load your CSV file
csv_file = "/home/sharvesh/Documents/Others/Human_AI/Model/data/output/datas
df = pd.read_csv(csv_file)

line_images = df['image_path'].tolist()
texts = df['text'].tolist()

# Run evaluation
evaluate_model(line_images, texts, target_size=(256, 64), batch_size=2)
```

```
Config of the encoder: <class 'transformers.models.vit.modeling_vit.ViTModel'> is overwritten by shared encoder config: ViTConfig {
    "attention_probs_dropout_prob": 0.0,
    "encoder_stride": 16,
    "hidden_act": "gelu",
    "hidden_dropout_prob": 0.0,
    "hidden_size": 1024,
    "image_size": 384,
    "initializer_range": 0.02,
    "intermediate_size": 4096,
    "layer_norm_eps": 1e-12,
    "model_type": "vit",
    "num_attention_heads": 16,
    "num_channels": 3,
    "num_hidden_layers": 24,
    "patch_size": 16,
    "pooler_act": "tanh",
    "pooler_output_size": 1024,
    "qkv_bias": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1"
}
```

```
Config of the decoder: <class 'transformers.models.trocr.modeling_trocr.Tr0CRForCausalLM'> is overwritten by shared decoder config: Tr0CRCConfig {
    "activation_dropout": 0.0,
    "activation_function": "relu",
    "add_cross_attention": true,
    "attention_dropout": 0.0,
    "bos_token_id": 0,
    "classifier_dropout": 0.0,
    "d_model": 1024,
    "decoder_attention_heads": 16,
    "decoder_ffn_dim": 4096,
    "decoder_layerdrop": 0.0,
    "decoder_layers": 12,
    "decoder_start_token_id": 2,
    "dropout": 0.1,
    "encoder_hidden_size": 1024,
    "eos_token_id": 2,
    "init_std": 0.02,
    "is_decoder": true,
    "layernorm_embedding": false,
    "max_position_embeddings": 1024,
    "model_type": "trocr",
    "pad_token_id": 1,
    "scale_embedding": true,
    "tie_word_embeddings": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1",
    "use_cache": false,
    "use_learned_position_embeddings": false,
    "vocab_size": 50265
}
```

Applied augmentation!

/home/sharvesh/.local/lib/python3.12/site-packages/transformers/generation/utils.py:1581: UserWarning: You have modified the pretrained model configuration to control generation. This is a deprecated strategy to control generation and will be removed in v5. Please use and modify the model generation configuration (see https://huggingface.co/docs/transformers/generation_strategies#default-text-generation-configuration)
warnings.warn(

Target: AI
Prediction: AI



=====

Target: INFINITAMENTE AMABLE
Prediction: ININITENTEABLEABLEABLE

INFINITAMENTE AMABLE

=====

Target: NIÑO JESUS.
Prediction: NI♦ JUS.

NINO JESUS.

=====

Target: A Uos, Dulcissimo Niño
Prediction: A U, Duliss Niño

A Uos , Dulcissimo Niño

=====

Target: JESUS, que no solo os
Prediction: JUS, no solo

JESUS , que no solo os

=====

Target: dignasteis de llamaros
Prediction: daste deamar

dignasteis de llamaros

=====



Target: Doctor de los Niños,
Prediction: Doctor losñ,

URGUALES L.S. ...AMALU

Doctor de los Niños,

=====

Target: sino tambien de assis-
Prediction: s tienamb deis

sino tambien de assis-

=====

Target: tir como Niño entre los Doctores,
Prediction: t com Niñore losores

tir como Niño entre los Doctores,

=====

Target: se consagra humilde esta pequeña
Prediction: seagra hum est peña

se consagra humilde esta pequeña

=====

Target: Instruccion de los Niños. Es assi,
Prediction: Instcc de Nios. ass,

Instruccion de los Niños. Es assi,

=====

Target: que ella tambien se dirige a la ju-
Prediction: quellaamb seige la-

que ella tambien se dirige à la ju-

=====

Target: uentud; pero a esta, como recuer-
Prediction: uud per aa,ooo com rec-

ventud ; pero à esta, como recuer-

Target: do de lo que aprendio, a los Niños
Prediction: do lo querend, los-

do de lo que aprendió, a los Niños

Target: ños, como precisa explicacion de
Prediction: ño com prec explacion

ños , como precisa explicacion de

Target: lo que deben estudiar. Por este so-
Prediction: lo deb estiar Por so-

lo que deben estudiar. Por este so-

Target: lo titulo es muy uuestra; y por
Prediction: loulo m uest; por

lo título es muy vuestra ; y por

Target: ser para Niños, que confiais a la
Prediction: ser Nios, confis la

ser para Niños, que confiais a la

Target: educacion de uuesta Compañia,
Prediction: educ deura deuraaaaaañ,

educacion de vuestra Compañia,

Target: lo es mucho mas. En Uos, (Divi-
Prediction: lo much mas Enos (ui

lo es mucho mas. En Vos, (Divi-

Target: no Exemplar de todas las virtudes
Prediction: noempl ded las uu-

no Exemplar de todas las virtudes

=====

Target: des) tienen abreviado el mas segundos
Prediction: des ten abui el se-

des) tienen abreviado el mas segundos

=====

Target: guro diseño de su edad: la Religión
Prediction: g diseño suad lai

guro diseño d su edad : la Reli-

=====

Target: gion para con Dios en la deuota
Prediction: g para D en la deota

gion para con Dios en la devota

=====

Target: assistencia a los Templos; la piedad
Prediction: assencia lososos laied

assistēcia à los Temp. os; la piecad

=====

Target: con los Padres en la obediencia
Prediction: con Padres laedcia

con los Padres en la obediencia

=====

Target: mas rendida; y la modestia, y de-
Prediction: masida y modest, deedia y-

mas rendida; y la modestia, y de-

Target: seo de saber, con los mayores,
Prediction: se deer con may,

seo de faber, con los mayores,

=====

Target: gustando mas de oir, y pregun-
Prediction: gando deer ygun-

gustando mas de oir, y pregun-

=====

Target: tar, que de definir, y resoluer. Bien
Prediction: tar que defin, resuer B

tar, que de definir, y resolver. Bien

=====

Target: que esto en uestra infinita Sabi-
Prediction: queo uest inf infitaitai--

que éto en vuestra infinita Sabi-

=====

Target: duria fue soberana dignacion, y
Prediction: d fueanaanaanaacion dign,

duria fuè soberana dignacion , y

=====

Target: en la natural ignorancia de los
Prediction: en naturalanc de los

en la natural ignorancia de los

=====

Target: Niños es indispensable necessi-
Prediction: Nios indispensabelei

Niños es indispensable necessi-

Target: dad.
Prediction: dad

dad.

=====

Target: Ni tienen solamente en Uos
Prediction: Niien soleee enos

Ni tienen solamente en Vos

=====

Target: el diseño, la luz, y el exemplo,
Prediction: elño lauz, l, el exempl, elo

el diseño , la luz , y el exemplo,

=====

Target: sino tambien el amor, y protec-
Prediction: s tienien elor yc-

sino tambien el amor , y protec-

=====

Target: cion. Uos, como singular Maes-
Prediction: c.... U, com singulares

cion. Vos, como singular Maes-

=====

Target: tro de los Niños, les dais enten-
Prediction: tro losñ,os de daos lesisen

tro de los Niños , les dais enten-

=====

Target: dimiento, y comunicais la sabi-
Prediction: dimo, comica lai-

dimiento , y comunicais la sabi-

Target: duria. Uos les prometeis el Reyno
Prediction: d..... U les promis Reyn

duria. Vos les prometeis el Reyno

Target: de los Cielos, y os indignais con
Prediction: de Cosos, osais con

de los Cielos , y os indignais con

Target: quien les aparta de Uos, y les
Prediction: qu lesaaa deos y

quiens aparta de Vos , y les

Target: proponeis por norma del can-
Prediction: propis para can can-

proponeis por norma del can-

Target: dor, inocencia, y christiana hu-
Prediction: dor inoc,encia yianau

dor, inocencia , y christiana hu-

Target: mildad. Uuestro amor parece que
Prediction: mad Uestroorare que que

mildad. Vuestro amor parece que

Target: no pudo explicarse mas tierno, y
Prediction: noudic masnonono y

no pudo explicarse mas tierno, y

Target: liberal con los Niños, pues no
Prediction: liberal losñ,ues no

liberal con los Niños , pues no

=====

Target: contento de echarles uestras di-
Prediction: content dechar uest di

contento de echarles vuestras di

=====

Target: uinas bendiciones, les unisteis
Prediction: u bendeseses lesiste

údivinas bendiciones , les unisteis

=====

Target: a uuestro sagrado pecho con sua-
Prediction: aestroadoadadochochocho cona

a vuestro sagrado pecho con sua-

=====

Target: uiissimos abrazos. Dichosa edad,
Prediction: uim abososoz.ich ed,,,,,

uiissimos abrazos. "Dichosa ed.ad,

=====

Target: que os merecio tan regalados cariños!
Prediction: que mereio regadosi carñ

que os mereció tan regalados ca-

=====

Target: Y pues en la celestial Jeru-
Prediction: Yues la Jeralu

Y pues en la celestial Teru-

=====

Target: salen no ha mudado de condicion
Prediction: sal no mud deicion

salèn no ha mudado de condicion

Target: uuestra Benignidad, proseguid,
Prediction: uuraign,,,gu,gu,gu,gu,

vuestra Benignidad, proseguid,

Target: o Niño tierno, y Dios Eterno,
Prediction: o tier tier, D Eo

o Niño tierno, y Dios Eterno,

Target: proseguid en bendecirles, y fauo-
Prediction: progu enecir, fau-

proseguid en bendecirles, y favo-

Target: recerles. Sean tan feruorosamen-
Prediction: reles Sean feroros-

recerles. Sean tan fervorosamen-

Target: te deuotos de uuestra Admirable
Prediction: teu deu deura Admir Admir

te devotos de vuestra Admirable

Target: MADRE, que se porten como sus
Prediction: MRE, se port com sus

MADRE, que se porten como sus

Target: hijos, y hermanos de leche con
Prediction: hos yman deche con

hijos, y hermanos de leche con

Target: Uos. Seran sabios, si fueren cas-
Prediction: U.....anos, fueren cas cas--

Vos. Serán sabios, si fueren ca-

=====

Target: tos; que no entra uuestra Sabi-
Prediction: t;;;; que ent uest Sab-

tos ; que no entra vuestra Sabi-

=====

Target: duria, donde no ay mucha pure-
Prediction: d,,,,,,onde aya pure-

duría , donde no ay mucha pure-

=====

Target: za de conciencia. Crezcan en
Prediction: za conencia Crecan

za de conciencia. Crezcan en

=====

Target: uuestro santo temor, y amor, co-
Prediction: uu s s s tem toor yor co

vuestro santo temor, y amor, co-

=====

Target: como en los años, y mucho mas.
Prediction: com en añ,osos yo mas

como en los años, y mucho mas.

=====

Target: Adelantense en la uirtud, como
Prediction: Adant en uud com

Adelantense en la virtud , como

=====

Target: en las letras, y mucho mas; has-
Prediction: en let, much much mas has

en las letras , y mucho mas ; has-

Target: ta que lleguen, por uuesetra imi-
Prediction: ta llegen poruesrai-

ta que lleguen , por vuestra imi-

=====

Target: tacion, a ser uarones perfectos,
Prediction: t,ion a uonesosos,

tacion , à fer varones perfectos,

=====

Target: y consumados, agradables a
Prediction: yadosados agables a

y consumados , agradables à

=====

Target: uestros ojos, y pruechosos a
Prediction: uurosj, pos yrouos a

vuestros ojos , y provechosos à

=====

Target: la Republica, que libra casi to-
Prediction: laaaaaaica quera cas to

la Republica , que libra casi to-

=====

Target: da su felicidad en la acertada
Prediction: da felidad laert

da su felicidad en la acertada

=====

Target: crianza de la niñez. Assi sea,
Prediction: cza de niez Ass sea

crianza de la Niñez; Así sea

Target: Diuinissimo Niño, por uuesta
Prediction: Dinimo Niño porura

Diviniſſimo Niño , por vueſtr

Target: gracia, assi sea, a uestra ma-
Prediction: gr.,i sea, uest ma

DIVINIſſIMO NIÑO , por vueſtr
gracia , así sea , à vueſtra ma

Target: yor gloria. Amen.
Prediction: y gl.....

yor gloria. Amen.

Target: CENSURA DEL R. P. ANTONIO CO-
Prediction: CSURA R.....TON CO

CENSURA DEL R. P. ANTONIO CO

Target: dorniu de la Compañia de jesus, Maes-
Prediction: diu laaaaaaaaia j jññ dees,es-

dorniu de la Compañia de Jesus , Maes-

Target: tro que fue de Theologia, Examinador
Prediction: tro fue de Theia, amin Exador

tro que fué de Théologie , Examinador
en la Universidad de Gerona Tres

Target: Synodal de los Obispados de Gerona, Ur-
Prediction: Synal losisp de Geros deona Ur

Synodal de los Obispados de Gerona , U

Target: gel, y Barcelona, Oc.
Prediction: gel y....., O...

gel, y Barcelona, Oc.

=====

Target: DE orden del Ilustre Señor Don Fran-
Prediction: DEen Ilust Seor Fran-----

DE orden del Ilustre Señor Don Fran

=====

Target: cisco Drechos, Canonigo, y Sacristan
Prediction: c Dre Dreos Canon, Sacan, Sacan

cisco Drechos, Canonigo, y Sacristan

=====

Target: Dignidad de la Santa Iglesia de Gerona, y
Prediction: Didad la Igiaiaiaia Ger,....

Dignidad de la Santa Iglesia de Gerona, y

=====

Target: Uicario General por el Ilustrissimo Señor
Prediction: Uarioner por llrimo Seor

Vicario General por el Ilustrissimo Señor

=====

Target: D. Balthasar de Bastero y Lledo, Obispo
Prediction: D Balth deast y,po Obpo

D. Balthasar de Bastero y Lledo, Obispo

=====

Target: de Gerona, del Consejo de su Magestad, & c.
Prediction: deona delse dejó suest, c

de Gerona, del Consejo de su Magestad, &c.

=====

Target: He visto un Librito, cuyo titulo es: Ins-
Prediction: Heist unrito Lib,uy tit es Ins

He visto un Librito, cuyo titulo es: Ins

Target: truccion de Christiana, y Politica Cortesana
Prediction: tcc dea deaiana yica Cort Cort-

truccion de Christiana, y Politica Cortesana

Target: nia, Oc. Su Author D. Fausto Agustin de
Prediction: nia O..... Author.o Faust Agin

nia, Oc. Su Author D. Fausto Agustin de

Target: Buendia, Colegial que fue en el Imperial
Prediction: Buia,leg que fue en Imperial

Buéndia, Colegial que fué en el Imperial

Target: de Cordellas, &c. Y brevemente digo,
Prediction: deell,c Yuement digo,oo,

de Cordellas, &c. Y brevemente digo,

Target: no solo que nada contiene contra la Fe, y
Prediction: no que n cont contene la,,,

no solo que nada contiene contra la Fé, y

Target: buenas costumbres, sino que muy atento
Prediction: buasumb,ino m que m at

buenas costumbres , sino que muy atento

Target: el Author con entrambas, describe, y en-
Prediction: el con entbas describe y--

el Author con entrambas , describe ,y en-

Target: seña tan culta, y discreta la Uirtud, co-
Prediction: se tanaaaaaaa, disca yret lairt,-

seña tan culta , y discreta la Virtud , co-

Target: mo santa la Policia, y Urbanidad. Los
Prediction: moanta Pol,,, Urban. Los

mo Santa la Pólicia , y Urbanidad. Los

=====

Target: Señoritos, que se criaren con estos do-
Prediction: Seoros que caren est do

Señoritos , que se criáren con estos do-

=====

Target: cumentos, mereceran, quando hombres,
Prediction: cosos,cer,ceran qu homb hres

cumentos , merecerán , quando hombres

=====

Target: auer nacido Señores. Porque no solo sa-
Prediction: auerac Seores Por no sa

aver nacido Señores. Porque no solo sa-

=====

Target: bran ser Caballeros, sino tambien a lo
Prediction: br serall,ino s tien a

bran ser Caballeros , sino tambien a lo

=====

Target: DON PHELIPPE POR LA
Prediction: DONELPEOR

DOÑA MARGARITA DE ARAGÓN PHELIPPE POR LA

=====

Target: Gracia de Dios, Rey de Castilla, de
Prediction: Gr deios Rey Castilla de

GRACIA DE DIOS, REY DE CASTILLA, DE

=====

Target: Leon, de Aragon, de las dos Sici-
Prediction: Leon deagon de dos Sic-

LEON, DE ARAGON, DE LAS DOS SICIS

Target: Irias, de Hierusalem, de Portugal, de
Prediction: I, Hier deusalem de,,, Portugal de,

Irias, de Hierusalem, de Portugal, de

=====

Target: Nauarra, de Granada, de Toledo,
Prediction: Nar, Gran, Gran, deada de,,,...

Nauarra, de Granada, de Toledo,

=====

Target: de Ualencia, de Galizia, de Mallorca,
Prediction: deal, deiz deiz, Ma,ia, Malca

de Ualencia, de Galizia, de Mallorca,

=====

Target: de Seuilla, de Cerdeña, de Cordoua,
Prediction: deilla dedeilla dedeña deña deou,

de Seuilla, de Cerdeña, de Cordoua,

=====

Target: de Corcega, de Murcia, de Jaen, de
Prediction: dece, Murga decia deen, ja,

de Corcega, de Murcia, de Jaen, de

=====

Target: los Algarues, de Algecira, de Gibraltar, de las Islas de
Prediction: losgar,es degeira de,,,..., Gibraltar de ls de

los Algarues, de Algecira, de Gibraltar, de las Islas de

=====

Target: Canaria, de las Indias Orientales, y Occidentales, Islas
Prediction: Can,,, , lasiasiasalesales yidentales ls

Canaria , de las Indias Orientales , y Occidentales , Islas

=====

Target: y tierra firme del mar Oceano, Archiduque de Austria,
Prediction: yra fir del Oano Archque Archque de,, Austria,

y tierra firme del mar Oceano ; Archiduque de Austria,

=====

Target: Duque de Borgoña, de Brauante, y Milan, Conde de Abs
Prediction: Du dego, marña deuante y,,, Cond de

y tierra firme del mar Oceano ; Archiduque de Austria,
Duque de Borgoña , de Brauante y Milan, Conde de Abs

Target: purg, de Flandes, y de Tirol, señor de Uizcaya, y de Mo-
Prediction: p,,, Fes, Fes y Ti,ñ,ñ deor Uc, y Mo
purg, de Flandes, y de Tirol, señor de Vizcaya , y de Mo-

Target: lina, &c. Por quanto por parte de uos, el Reuerendo in
Prediction: I,,, &..... quant pore u, Rerend in
lina, &c. Pót quanto por parte d' eos, el Reuerendo in

Target: Christo Padre, don Pedro Manso, Obispo de Calahorra,
Prediction: Christ Pad, Pedro Pedroooo Obpo Calor,
Christò Padre, don Pedro Manso, Obilpo de Calahorra,

Target: y la Calzada, del nuestro Consejo: nos fue hecha relacion
Prediction: y Calada delestrosesesejosejo: fuechaacion
y la Calçada, del nuestro Ccnsejo : nos fue hecha relación

Target: que en un Synodo que se hauia hecho en la ciudad de Lo-
Prediction: que unodo se haiachochochochacho laiud de-
que en un Synodo que se hauia hecho en la ciudad de Lo-

Target: grono, de esse Obispado, se hauian hecho algunas Consti-
Prediction: go, es Obado seu he al al al algungungungungun Const-
grono, de esse Obispado, se hauian hecho algunas Consti-

Target: tuciones Synodales, y reformadas las antiguas, y nos fue
Prediction: tion Synales yoles yadas yadas lasigas y fue
tuciones Synodales, y reformadas las antiguas, y nos fue

Target: pedido, y suplicado os mandasemos dar licencia para que
Prediction: ped, yplado mand osasem d lic para
pedido, y suplicado os mandasemos dar licécia para que

Target: se imprimiessen las dichas constituciones, y lo pudiesse
Prediction: serimessen dich Constuces y piesse
se imprimiessen las dichas Constituciones, y lo pudiesse

=====
Target: hazer qualquier impressor de estos nuestros Reynos que
Prediction: h qualierorororor deosest nurosososos
hazer qualquier impressor de estos nuestros Reynos que
=====

=====
Target: uos nombrasedes, o como la nuestra merced fuese. Lo
Prediction: u nbres, comes, com laest mer fuse Lo
uos nombrasedes, o como la nuestra merced fuese. Lo
=====

=====
Target: qual uisto por los del nuestro Consejo, y lo pedido cerca
Prediction: qualist por delestroseestrosejojo y ped ca
qual visto por los del nuestro Consejo, y lo pedido cerca
=====

=====
Target: de ello por el Licenciado Gil Ramirez de Arellano nue-
Prediction: dello elenen Gilenado Ramirez Areanoue-
de ello por el Licenciado Gil Ramirez de Arellano nue-
=====

=====
Target: stro Fiscal, y la contradizion fecha, por parte de la Pro-
Prediction: stro,,, laiz, laiz fe,cha pore la-
stro Fiscal, y la contradizion fecha, por parte de la Pro-
=====

=====
Target: uincia y hermandades de Alaua, fue acordado que deuia-
Prediction: uia y herades deau, acado deu-----
uincia y hermandades de Alaua, fue acordado que deuia-
=====

=====
Target: mos mandar dar esta nuestra carta en la dicha razon, y
Prediction: mosarararar est nuest cart en dich r r,
mos mandar dar esta nuestra carta en la dicha razon, y
=====

=====
Target: nos tuuimos lo por bien. Por la qual uos damos licencia
Prediction: nosuuos porien Por qual dam dam lic lic lic licenciaencia
nos tuuimos lo por bien. Por la qual uos damos licencia
=====

Target: y facultad para que qualquier impressor de estos nuestros
Prediction: yad para qualierororor est deosestos

y facultad para que qualquier impressor de estos nuestros

=====

Target: Reynos, que uos nombraredes, pueda imprimir las di-
Prediction: Reos, u nrared,ued impir las di-

Reynos , que vos nombraredes, pueda imprimir las di-

=====

Target: chase Constituciones Synodales, con que despues de im-
Prediction: ch Constucion Synales con desp de-

chas Constituciones Synodales, con que despues de im-

=====

Target: pressas no se pueda usar de ellas antes que se traygan an-
Prediction: press no pa us us deas ell ant que tray an-

pressas no se pueda vſar de ellas antes que se traygan an-

=====

Target: te nos. y se corrijan con el original que ua rubricado y fir-
Prediction: te. seri con con original u rubado y--

tenos. y se corrijan con el original que va rubricado y fir-

=====

Target: mado al fin de ellas de Christoual Nuñez de Leon, nuestro
Prediction: m al deas Christalñ Nuez Leon nu

mado al fin de ellas de Christoual Nuñez de Leon, nuestro

=====

Target: escriuano de Camara. de los que residen en el nuestro Con
Prediction: escu deara deara de queiden elestro

escriuano de Camara. de los que residen en el nuestro Cō

=====

Target: sejo, y se tasse el precio a que se huiiere de uender cada
Prediction: se,, seasse prec a se hiere u c c c c

sejo, y se tasse el precio a que se huiiere de vender cada

Target: pliego de ellas, so pena de caer e incurri en las penas, con
Prediction: plgo ell, pen de pen deer incur incur en pen,

pliego de ells, so pena de caer e incurri en las penas, con

=====

Target: tenidas en la pragmatica y leyes de nuestros Reynos, que
Prediction: ten en pragmatic yyes nurosososos que,

tenidas en la pragmatiy leyes de nuestros Reynos, q
disponen sobre la impresión de los libros

=====

Target: disponen sobre la impression de los libros, y nos agades en
Prediction: disonenbre impression los libros de lib, nosades el

disponen sobre la impresión de los libros, y no fagades en el

=====

Target: de al. De lo qual mandamos dar, y dimos esta nuestra car-
Prediction: de.. lo mandam d, dim est est nura ca

de al. De lo qual mandamos dar, y dimos ésta nucitra ca

=====

Target: ta, sellada con nuestro sello, y librada por los de nuestro
Prediction: ta sell conestro sell, l,ibr, lada los nu

ta, sellada con nuestro selló , y librada por los del nueft

=====

```
In [9]: import pandas as pd
import albumentations as A
import torch
from torch.utils.data import Dataset, DataLoader, random_split
from transformers import TrOCRProcessor, VisionEncoderDecoderModel, Trainer,
from PIL import Image
import numpy as np
from torch.nn.utils.rnn import pad_sequence
from torch.optim import AdamW
from torch.optim.lr_scheduler import ReduceLROnPlateau
import evaluate # Updated for metrics
import os

# Load CER and WER metrics
cer_metric = evaluate.load("cer")
wer_metric = evaluate.load("wer")

# Define compute_metrics function
def compute_metrics(eval_pred):
    logits, labels = eval_pred
    if isinstance(logits, tuple):
```

```

        logits = logits[0]
        predictions = logits.argmax(-1)
        decoded_preds = processor.tokenizer.batch_decode(predictions, skip_special_tokens=True)
        decoded_labels = []
        for label in labels:
            label_filtered = [token for token in label if token != -100]
            decoded_label = processor.tokenizer.decode(label_filtered, skip_special_tokens=True)
            decoded_labels.append(decoded_label)
        cer_score = cer_metric.compute(predictions=decoded_preds, references=decoded_labels)
        wer_score = wer_metric.compute(predictions=decoded_preds, references=decoded_labels)
        return {"cer": cer_score, "wer": wer_score}

# Custom Dataset class (unchanged)
class LineDataset(Dataset):
    def __init__(self, processor, model, line_images, texts, target_size=(256, 256)):
        self.line_images = line_images
        self.texts = texts
        self.processor = processor
        self.processor.image_processor.max_length = max_length
        self.processor.tokenizer.model_max_length = max_length
        self.model = model
        self.model.config.max_length = max_length
        self.target_size = target_size
        self.max_length = max_length
        self.apply_augmentation = apply_augmentation
        if apply_augmentation:
            self.transform = A.Compose([
                A.OneOf([
                    A.Rotate(limit=2, p=1.0),
                    A.GaussNoise(var_limit=(5.0, 10.0), p=1.0),
                    A.GaussianBlur(blur_limit=(3, 5), p=1.0),
                    A.RandomBrightnessContrast(brightness_limit=0.1, contrast_limit=0.1, p=1.0),
                    A.OpticalDistortion(distort_limit=0.02, shift_limit=0.02, p=1.0)
                ], p=0.8),
            ])
        else:
            self.transform = A.Compose([])
        print("Applied augmentation!")

    def __len__(self):
        return len(self.line_images)

    def __getitem__(self, idx):
        image = self.line_images[idx]
        text = self.texts[idx]
        if isinstance(image, str):
            image = Image.open(image).convert("RGB")
        elif isinstance(image, np.ndarray):
            image = Image.fromarray(image).convert("RGB")
        image = np.array(image)
        if self.apply_augmentation:
            augmented = self.transform(image=image)
            image = augmented['image']
        image = Image.fromarray(image).resize(self.target_size, Image.BILINEAR)
        image = np.array(image) / 255.0
        image = np.transpose(image, (2, 0, 1))
        return {"text": text, "image": image}

```

```

        encoding = self.processor(images=image, text=text, return_tensors="pt")
        encoding['labels'] = encoding['labels'][:, :self.max_length]
        return {k: v.squeeze() for k, v in encoding.items()}

# Collate function
def collate_fn(batch):
    pixel_values = torch.stack([item['pixel_values'] for item in batch])
    labels = pad_sequence([item['labels'] for item in batch], batch_first=True)
    return {'pixel_values': pixel_values, 'labels': labels}

# Training function for the fine-tuned model
def continue_training_finetuned_model(line_images, texts, target_size=(256,
    print("Inside continue training function!")
    device = torch.device("cpu") # Adjust to "cuda" if GPU available

    # Load the fine-tuned model and processor
    global processor
    save_dir = "/media/sharvesh/Expansion/Documents/model/finetuned_trocr_sp"
    processor = TrOCRProcessor.from_pretrained(save_dir, do_rescale=False)
    model = VisionEncoderDecoderModel.from_pretrained(save_dir).to(device)

    # Load or define generation config
    generation_config = GenerationConfig(max_length=512, no_repeat_ngram_size=2)

    # Create dataset (use same or new data)
    dataset = LineDataset(processor, model, line_images, texts, target_size,
    val_size = int(len(dataset) * val_split)
    train_size = len(dataset) - val_size
    train_dataset, val_dataset = random_split(dataset, [train_size, val_size])

    print(f"Training dataset size: {len(train_dataset)}")
    print(f"Validation dataset size: {len(val_dataset)}")

    # Define training arguments for continued training
    training_args = TrainingArguments(
        output_dir="/media/sharvesh/Expansion/Documents/model/results_continued",
        num_train_epochs=5, # Fewer epochs for additional training (adjust as needed)
        per_device_train_batch_size=batch_size,
        per_device_eval_batch_size=batch_size,
        logging_dir=".//logs_continued_v2",
        logging_steps=20, # More frequent logging
        save_steps=100,
        save_total_limit=2,
        evaluation_strategy="steps",
        eval_steps=50,
        learning_rate=1e-5, # Lower learning rate for fine-tuning
        weight_decay=0.01,
        load_best_model_at_end=True,
        metric_for_best_model="cer",
        greater_is_better=False,
        gradient_accumulation_steps=16,
        fp16=False, # Set to True if using GPU with CUDA
        use_cpu=True, # Set to False if using GPU
        logging_first_step=True,
    )

```

```

# Define optimizer and scheduler
optimizer = AdamW(model.parameters(), lr=training_args.learning_rate, weight_decay=0.01)
scheduler = ReduceLROnPlateau(optimizer, mode='min', factor=0.1, patience=3)

# Initialize trainer
trainer = Trainer(
    model=model,
    args=training_args,
    train_dataset=train_dataset,
    eval_dataset=val_dataset,
    data_collator=collate_fn,
    optimizers=(optimizer, scheduler),
    callbacks=[EarlyStoppingCallback(early_stopping_patience=5)],
    compute_metrics=compute_metrics
)

# Continue training
trainer.train()

# Save the updated fine-tuned model
os.makedirs(updated_save_dir, exist_ok=True)
model.save_pretrained(updated_save_dir)
processor.save_pretrained(updated_save_dir)
print(f"Updated model saved to {updated_save_dir}")

# Load your CSV file and prepare data
csv_file = "/home/sharvesh/Documents/Others/Human_AI/Model/data/output/datas.csv"
df = pd.read_csv(csv_file)

# Assuming columns 'image_path' and 'text' (updated from 'ground_truth')
line_images = df['image_path'].tolist()
texts = df['text'].tolist()

# Continue training the fine-tuned model
continue_training_finetuned_model(line_images, texts, target_size=(256, 64),

```

Inside continue training function!

```
Config of the encoder: <class 'transformers.models.vit.modeling_vit.ViTModel'> is overwritten by shared encoder config: ViTConfig {
    "attention_probs_dropout_prob": 0.0,
    "encoder_stride": 16,
    "hidden_act": "gelu",
    "hidden_dropout_prob": 0.0,
    "hidden_size": 1024,
    "image_size": 384,
    "initializer_range": 0.02,
    "intermediate_size": 4096,
    "layer_norm_eps": 1e-12,
    "model_type": "vit",
    "num_attention_heads": 16,
    "num_channels": 3,
    "num_hidden_layers": 24,
    "patch_size": 16,
    "pooler_act": "tanh",
    "pooler_output_size": 1024,
    "qkv_bias": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1"
}
```

```
Config of the decoder: <class 'transformers.models.trocr.modeling_trocr.Tr0CRForCausalLM'> is overwritten by shared decoder config: Tr0CRCConfig {
    "activation_dropout": 0.0,
    "activation_function": "relu",
    "add_cross_attention": true,
    "attention_dropout": 0.0,
    "bos_token_id": 0,
    "classifier_dropout": 0.0,
    "d_model": 1024,
    "decoder_attention_heads": 16,
    "decoder_ffn_dim": 4096,
    "decoder_layerdrop": 0.0,
    "decoder_layers": 12,
    "decoder_start_token_id": 2,
    "dropout": 0.1,
    "encoder_hidden_size": 1024,
    "eos_token_id": 2,
    "init_std": 0.02,
    "is_decoder": true,
    "layernorm_embedding": false,
    "max_position_embeddings": 1024,
    "model_type": "trocr",
    "pad_token_id": 1,
    "scale_embedding": true,
    "tie_word_embeddings": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1",
    "use_cache": false,
    "use_learned_position_embeddings": false,
    "vocab_size": 50265
}
```

```
Applied augmentation!
Training dataset size: 528
Validation dataset size: 58
/home/sharvesh/.local/lib/python3.12/site-packages/transformers/training_arg
s.py:1611: FutureWarning: `evaluation_strategy` is deprecated and will be re
moved in version 4.46 of 🤗 Transformers. Use `eval_strategy` instead
    warnings.warn(
/home/sharvesh/.local/lib/python3.12/site-packages/transformers/modeling_uti
ls.py:3353: UserWarning: Moving the following attributes in the config to th
e generation config: {'max_length': 512}. You are seeing this warning becaus
e you've set generation parameters in the model config, as opposed to in the
generation config.
    warnings.warn(
Updated model saved to /media/sharvesh/Expansion/Documents/model/finetuned_t
rocr_spanish_historical_v3
```

```
In [15]: from transformers import VisionEncoderDecoderModel, TrOCRProcessor

checkpoint_path = "/media/sharvesh/Expansion/Documents/model/results_continu
model = VisionEncoderDecoderModel.from_pretrained(checkpoint_path)
processor = TrOCRProcessor.from_pretrained(checkpoint_path)

# Save permanently
final_save_path = "/media/sharvesh/Expansion/Documents/model/finetuned_trocr
model.save_pretrained(final_save_path)
processor.save_pretrained(final_save_path)
print(f'Recovered model saved to {final_save_path}')
```

```
Config of the encoder: <class 'transformers.models.vit.modeling_vit.ViTModel'> is overwritten by shared encoder config: ViTConfig {
    "attention_probs_dropout_prob": 0.0,
    "encoder_stride": 16,
    "hidden_act": "gelu",
    "hidden_dropout_prob": 0.0,
    "hidden_size": 1024,
    "image_size": 384,
    "initializer_range": 0.02,
    "intermediate_size": 4096,
    "layer_norm_eps": 1e-12,
    "model_type": "vit",
    "num_attention_heads": 16,
    "num_channels": 3,
    "num_hidden_layers": 24,
    "patch_size": 16,
    "pooler_act": "tanh",
    "pooler_output_size": 1024,
    "qkv_bias": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1"
}
```

```
Config of the decoder: <class 'transformers.models.trocr.modeling_trocr.Tr0CRForCausalLM'> is overwritten by shared decoder config: Tr0CRCConfig {
    "activation_dropout": 0.0,
    "activation_function": "relu",
    "add_cross_attention": true,
    "attention_dropout": 0.0,
    "bos_token_id": 0,
    "classifier_dropout": 0.0,
    "d_model": 1024,
    "decoder_attention_heads": 16,
    "decoder_ffn_dim": 4096,
    "decoder_layerdrop": 0.0,
    "decoder_layers": 12,
    "decoder_start_token_id": 2,
    "dropout": 0.1,
    "encoder_hidden_size": 1024,
    "eos_token_id": 2,
    "init_std": 0.02,
    "is_decoder": true,
    "layernorm_embedding": false,
    "max_position_embeddings": 1024,
    "model_type": "trocr",
    "pad_token_id": 1,
    "scale_embedding": true,
    "tie_word_embeddings": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1",
    "use_cache": false,
    "use_learned_position_embeddings": false,
    "vocab_size": 50265
}
```

Recovered model saved to /media/sharvesh/Expansion/Documents/model/finetuned_trocr_spanish_historical_v3

```
In [17]: import torch
from torch.utils.data import DataLoader
import matplotlib.pyplot as plt
from jiwer import cer, wer
from PIL import Image
import numpy as np
import os

# Function to evaluate the trained model
def evaluate_model(line_images, texts, target_size=(256, 64), batch_size=2):
    device = torch.device("cuda" if torch.cuda.is_available() else "cpu")

    # Define model and processor paths (update paths accordingly)
    model_path = "/media/sharvesh/Expansion/Documents/model/finetuned_trocr_processor_path = model_path

    processor = TrOCRProcessor.from_pretrained(processor_path)
    model = VisionEncoderDecoderModel.from_pretrained(model_path).to(device)
    model.eval()

    dataset = LineDataset(processor, model, line_images, texts, target_size,
    dataloader = DataLoader(dataset, batch_size=batch_size, shuffle=False, c

    cer_scores = []
    wer_scores = []
    predictions = []

    with torch.no_grad():
        for batch in dataloader:
            pixel_values = batch["pixel_values"].to(device)
            generated_ids = model.generate(pixel_values)
            generated_texts = processor.tokenizer.batch_decode(generated_ids)

            for i, pred in enumerate(generated_texts):
                gt = texts[len(predictions)] # Ground truth

                # Compute CER and WER
                cer_scores.append(cer(gt, pred))
                wer_scores.append(wer(gt, pred))

            predictions.append(pred)

            # Display image and predictions
            image_path = line_images[len(predictions) - 1]
            if isinstance(image_path, str):
                image = Image.open(image_path).convert("L")
            else:
                image = Image.fromarray(image_path).convert("L")

            plt.figure(figsize=(8, 6))
            plt.imshow(image, cmap='gray')
            plt.title(f"Target: {gt}\nPrediction: {pred}")
            plt.axis('off')
```

```
plt.show()
print("=" * 50)

# Compute average scores
avg_cer = sum(cer_scores) / len(cer_scores) if cer_scores else 0
avg_wer = sum(wer_scores) / len(wer_scores) if wer_scores else 0

print(f"Average CER: {avg_cer:.4f}")
print(f"Average WER: {avg_wer:.4f}")
print("Evaluation completed.")

# Print all predictions
for i, pred in enumerate(predictions):
    print(f"{i+1}: {pred}")

# Load your CSV file
csv_file = "/home/sharvesh/Documents/Others/Human_AI/Model/data/output/datas
df = pd.read_csv(csv_file)

line_images = df['image_path'].tolist()
texts = df['text'].tolist()

# Run evaluation
evaluate_model(line_images, texts, target_size=(256, 64), batch_size=2)
```

```
Config of the encoder: <class 'transformers.models.vit.modeling_vit.ViTModel'> is overwritten by shared encoder config: ViTConfig {
    "attention_probs_dropout_prob": 0.0,
    "encoder_stride": 16,
    "hidden_act": "gelu",
    "hidden_dropout_prob": 0.0,
    "hidden_size": 1024,
    "image_size": 384,
    "initializer_range": 0.02,
    "intermediate_size": 4096,
    "layer_norm_eps": 1e-12,
    "model_type": "vit",
    "num_attention_heads": 16,
    "num_channels": 3,
    "num_hidden_layers": 24,
    "patch_size": 16,
    "pooler_act": "tanh",
    "pooler_output_size": 1024,
    "qkv_bias": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1"
}
```

```
Config of the decoder: <class 'transformers.models.trocr.modeling_trocr.Tr0CRForCausalLM'> is overwritten by shared decoder config: Tr0CRCConfig {
    "activation_dropout": 0.0,
    "activation_function": "relu",
    "add_cross_attention": true,
    "attention_dropout": 0.0,
    "bos_token_id": 0,
    "classifier_dropout": 0.0,
    "d_model": 1024,
    "decoder_attention_heads": 16,
    "decoder_ffn_dim": 4096,
    "decoder_layerdrop": 0.0,
    "decoder_layers": 12,
    "decoder_start_token_id": 2,
    "dropout": 0.1,
    "encoder_hidden_size": 1024,
    "eos_token_id": 2,
    "init_std": 0.02,
    "is_decoder": true,
    "layernorm_embedding": false,
    "max_position_embeddings": 1024,
    "model_type": "trocr",
    "pad_token_id": 1,
    "scale_embedding": true,
    "tie_word_embeddings": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1",
    "use_cache": false,
    "use_learned_position_embeddings": false,
    "vocab_size": 50265
}
```

Applied augmentation!

/home/sharvesh/.local/lib/python3.12/site-packages/transformers/generation/utils.py:1581: UserWarning: You have modified the pretrained model configuration to control generation. This is a deprecated strategy to control generation and will be removed in v5. Please use and modify the model generation configuration (see https://huggingface.co/docs/transformers/generation_strategies#default-text-generation-configuration)
warnings.warn(

Target: AI
Prediction: AI



=====

Target: INFINITAMENTE AMABLE
Prediction: INITENTENT AMEABLEABLE

INFINITAMENTE AMABLE

=====

Target: NIÑO JESUS.
Prediction: NI♦ JUS.

NINO JESUS.

=====

Target: A Uos, Dulcissimo Niño
Prediction: A U,,,cimo

A Uos , Dulcissimo Niño

=====

Target: JESUS, que no solo os
Prediction: JUS, no solo

JESUS , que no solo os

=====

Target: dignasteis de llamaros
Prediction: dasteis llosos

dignasteis de llamaros

=====



Target: Doctor de los Niños,
Prediction: Doctor losñ,

URGUALES L.S. ...AMALU

Doctor de los Niños,

=====

Target: sino tambien de assis-
Prediction: s tien deis-

sino tambien de assis-

=====

Target: tir como Niño entre los Doctores,
Prediction: t com Niñore Doct,

tir como Niño entre los Doctores,

=====

Target: se consagra humilde esta pequeña
Prediction: seagra hum est peñaque

se consagra humilde esta pequeña

=====

Target: Instruccion de los Niños. Es assi,
Prediction: Instcc de Nios. ass,,

Instruccion de los Niños. Es assi,

=====

Target: que ella tambien se dirige a la ju-
Prediction: quellaamb seige a ju--

que ella tambien se dirige à la ju-

=====

Target: uentud; pero a esta, como recuer-
Prediction: uud;o est,o com rec-

ventud ; pero à esta, como recuer-

Target: do de lo que aprendio, a los Niños
Prediction: do lo querend, los-

do de lo que aprenió, a los Niños

Target: ños, como precisa explicacion de
Prediction: ñ,o,oisaisaic explacion

ños , como precisa explicacion de

Target: lo que deben estudiar. Por este so-
Prediction: lo deb estiar Por so-

lo que deben estudiar. Por este so-

Target: lo titulo es muy uuestra; y por
Prediction: loulo m uest; por

lo título es muy vuestra ; y por

Target: ser para Niños, que confiais a la
Prediction: ser Nios, confis a

ser para Niños, que confiais a la

Target: educacion de uuesta Compañia,
Prediction: educ deura deest Compñ,

educación de vuestra Compañía,

Target: lo es mucho mas. En Uos, (Divi-
Prediction: lo much mas Enos (ui-

lo es mucho mas. En Vos, (Divi-

Target: no Exemplar de todas las virtudes
Prediction: noempl ded las uuu-

no Exemplar de todas las virtudes

=====

Target: des) tienen abreviado el mas se-
Prediction: des ten abui el se se

des) tienen abreviado el mas se-

=====

Target: guro diseño de su edad: la Reli-
Prediction: g diseño suad: Rel-

guro diseño d su edad : la Reli-

=====

Target: gion para con Dios en la deuota
Prediction: g para D en lau

gion para con Dios en la devota

=====

Target: assistencia a los Templos; la piedad
Prediction: assencia losososos; pad

assistēcia à los Temp.los; la piecad

=====

Target: con los Padres en la obediencia
Prediction: con Padres laedcia

con los Padres en la obediencia

=====

Target: mas rendida; y la modestia, y de-
Prediction: masida y modest, de-

mas rendida; y la modestia, y de-

Target: seo de saber, con los mayores,
Prediction: se deer con may,

seo de faber, con los mayores,

=====

Target: gustando mas de oir, y pregun-
Prediction: gando deer ygun-

gustando mas de oir, y pregun-

=====

Target: tar, que de definir, y resoluer. Bien
Prediction: tar que defin, resuer B

tar, que de definir, y resolver. Bien

=====

Target: que esto en uestra infinita Sabi-
Prediction: queo uest infitaitaaai--

que éto en vuestra infinita Sabi-

=====

Target: duria fue soberana dignacion, y
Prediction: d fueanaanaanaacion,

duria fuè soberana dignacion , y

=====

Target: en la natural ignorancia de los
Prediction: en naturalanc de

en la natural ignorancia de los

=====

Target: Niños es indispensable necessi-
Prediction: Nios es necessableii-i

Niños es indispensable necessi-

Target: dad.
Prediction: dad

dad.

=====

Target: Ni tienen solamente en Uos
Prediction: Niien soleeee enos

Ni tienen solamente en Vos

=====

Target: el diseño, la luz, y el exemplo,
Prediction: elño, l l,....., el exempl, elo

el diseño , la luz , y el exemplo,

=====

Target: sino tambien el amor, y protec-
Prediction: s tien elor yc-

sino tambien el amor , y protec-

=====

Target: cion. Uos, como singular Maes-
Prediction: c.... U,, com singulares--

cion. Vos, como singular Maes-

=====

Target: tro de los Niños, les dais enten-
Prediction: tro losñ, daos lesia ent-

tro de los Niños , les dais enten-

=====

Target: dimiento, y comunicais la sabi-
Prediction: dimooo, comicais sab-

dimiento , y comunicais la sabi-

Target: duria. Uos les prometeis el Reyno
Prediction: d..... U les promis elo

duria. Vos les prometeis el Reyno

Target: de los Cielos, y os indignais con
Prediction: de Cosos, os indign con

de los Cielos , y os indignais con

Target: quien les aparta de Uos, y les
Prediction: qu lesaaaa deos y

quiens aparta de Vos , y les

Target: proponeis por norma del can-
Prediction: propis poraa can----

proponeis por norma del can-

Target: dor, inocencia, y christiana hu-
Prediction: dor inoc,,cia, christ h-

dór , inocencia , y christiana hu-

Target: mildad. Uuestro amor parece que
Prediction: mad.u am pce que que

mildad. Vuestro amor parece que

Target: no pudo explicarse mas tierno, y
Prediction: noundoic mas tier,

no pudo explicarse mas tierno, y

Target: liberal con los Niños, pues no
Prediction: liberal losñ,ues no

liberal con los Niños , pues no

=====

Target: contento de echarles uestras di-
Prediction: content dechar uest di

contento de echarles vuestras di

=====

Target: uinas bendiciones, les unisteis
Prediction: u bendeseseses lesiste

údivinas bendiciones , les unisteis

=====

Target: a uuestro sagrado pecho con sua-
Prediction: auestror sagadochochocho su-

á vuestro sagrado pecho con sua-

=====

Target: uiissimos abrazos. Dichosa edad,
Prediction: uim abososososos.ich ed.....

uiissimos abrazos. "Dichosa ed.ad,

=====

Target: que os merecio tan regalados cariños!
Prediction: que mereio regadosi carñ-

que os mereció tan regalados ca-

=====

Target: Y pues en la celestial Jeru-
Prediction: Yues la Jeralu

Y pues en la celestial Teru-

=====

Target: salen no ha mudado de condicion
Prediction: sal no mud de condion

salén no ha mudado de condicion

Target: uestra Benignidad, proseguid,
Prediction: uraign,,,,,,guid,gu,gu,

vuestra Benignidad , proseguid,

Target: o Niño tierno, y Dios Eterno,
Prediction: o tier tier, D Eo

o Niño tierno , y Dios Eterno,

Target: proseguid en bendecirles, y fauo-
Prediction: progu enecir, f,au--

proseguid en bendecirles, y favo-

Target: recerles. Sean tan feruorosamen-
Prediction: reles Sean feroros-

recerles. Sean tan fervorosamen-

Target: te deuotos de vuestra Admirable
Prediction: teu deotos uest Admir

te devotos de vuestra Admirable

Target: MADRE, que se porten como sus
Prediction: MRE, se port com sus

MADRE , que se porten como sus

Target: hijos, y hermanos de leche con
Prediction: hos yman deche con

hijos , y hermanos de leche con

Target: Uos. Seran sabios, si fueren cas-
Prediction: U.....aniosios, fueen--

Vos. Serán sabios, si fueren ca-

Target: tos; que no entra uuestra Sabi-
Prediction: t;; que ent uest Sab-

tos ; que no entra vuestra Sabi-

Target: duria, donde no ay mucha pure-
Prediction: d,,,,,,onde ayaa pure-

duría , donde no ay mucha pure-

Target: za de conciencia. Crezcan en
Prediction: za conencia Crecan

za de conciencia. Crezcan en

Target: uuestro santo temor, y amor, co-
Prediction: uu s s tem tem, am, co

vuestro santo temor, y amor, co-

Target: como en los años, y mucho mas.
Prediction: com en aosñ, much mas

como en los años, y mucho mas.

Target: Adelantense en la uirtud, como
Prediction: Adant en uud,o

Adelantense en la virtud , como

Target: en las letras, y mucho mas; has-
Prediction: en let, much, much mas has

en las letras , y mucho mas ; has-

Target: ta que lleguen, por uuesetra imi-
Prediction: ta llegen poruesrai-

ta que lleguen , por vuestra imi-

=====

Target: tacion, a ser uarones perfectos,
Prediction: t,ion a uonesosososos

tacion , à fer varones perfectos,

=====

Target: y consumados, agradables a
Prediction: yadosados,rades agables

y consumados , agradables à

=====

Target: uestros ojos, y pruechosos a
Prediction: uuros oos yrouos a

vuestros ojos , y provechosos à

=====

Target: la Republica, que libra casi to-
Prediction: laaaaaaaaaica, lib, lib cas to

la Republica , que libra casi to-

=====

Target: da su felicidad en la acertada
Prediction: da felidad laert

da su felicidad en la acertada

=====

Target: crianza de la niñez. Assi sea,
Prediction: czaza lañ.i....i.i. sea

crianza de la Niñez; Así sea

Target: Diuinissimo Niño, por uuesta
Prediction: Diniss Niño,,o, uest

Diuinissimo Niño , por vuestr

Target: gracia, assi sea, a uestra ma-
Prediction: gr,,,i sea, uest ma

Diuinissimo Niño , por vuestr
gracia , así sea , à vuestra ma

Target: yor gloria. Amen.
Prediction: y gl.....

yor gloria. Amen.

Target: CENSURA DEL R. P. ANTONIO CO-
Prediction: CSURARA R R P ANIOIO-

CENSURA DEL R. P. ANTONIO CO

Target: dormiu de la Compañia de jesus, Maes-
Prediction: diu laaaañ deañiaia dees,es---

dormiu de la Compañia de Jesus , Maes-

Target: tro que fue de Theologia, Examinador
Prediction: tro fue deolog,amin Exador

tro que fué de Theología , Examinador
en la Universidad de Gerona Tres

Target: Synodal de los Obispados de Gerona, Ur-
Prediction: Synal de Obados deona Ur

Synodal de los Obispados de Gerona , U

Target: gel, y Barcelona, Oc.
Prediction: gel y..... O....

gel, y Barcelona, Oc.

=====

Target: DE orden del Ilustre Señor Don Fran-
Prediction: DEen delust Seor Fran-----

DE orden del Ilustre Señor Don Fran

=====

Target: cisco Drechos, Canonigo, y Sacristan
Prediction: c Dreos,igo,igoo, Sacan

cambios Drechos , Canónigo , y Sacristán

=====

Target: Dignidad de la Santa Iglesia de Gerona, y
Prediction: Didad de Santales deona y

Dignidad de la Santa Iglesia de Gerona , y

=====

Target: Uicario General por el Ilustrissimo Señor
Prediction: Uario por elustiss Seor

Vicario General por el Ilustrissimo Señor

=====

Target: D. Balthasar de Bastero y Lledo, Obispo
Prediction: D Basar deaster ylld,is

D. Balthasar de Bastero y Lledò , Obispo

=====

Target: de Gerona, del Consejo de su Magestad, & c.
Prediction: deona delse de Magad &.....

de Gerona, del Consejo de su Magestad,&c.

=====

Target: He visto un Librito, cuyo titulo es: Ins-
Prediction: Heist unrito Lib,,,oulo tit es Ins

He visto un Librito , cuyo título es: Ins

=====

Target: truccion de Christiana, y Politica Cortesana
Prediction: tccion Christian, Polit Cort

truccion de Christiana, y Politica Cortesana

=====

Target: nia, Oc. Su Author D. Fausto Agustin de
Prediction: nia O..... Author.o Agin Agin

nia, Oc. Su Author D. Fausto Agustin de

=====

Target: Buendia, Colegial que fue en el Imperial
Prediction: Buia,leg que en el

Buéndia, Colegial que fué en el Imperial

=====

Target: de Cordellas, &c. Y breuemente digo,
Prediction: deell,c Yuement dig,

de Cordellas, &c. Y breuemente digo,

=====

Target: no solo que nada contiene contra la Fe, y
Prediction: no queadaierai contra la,

no solo que nada contiene contra la Fé, y

=====

Target: buenas costumbres, sino que muy atento
Prediction: buasumb,ino m m m m m at

buenas costumbres , sino que muy atento

=====

Target: el Author con entrabbas, describe, y en-
Prediction: el con entbas,,,...,ibe y-

el Author con entrabbas , describe ,y en-

=====

Target: seña tan culta, y discreta la Uirtud, co-
Prediction: se tanaaaaaaa, disca yret lairt,-ud co

seña tan culta , y discreta la Virtud , co-

Target: mo santa la Policia, y Urbanidad. Los
Prediction: moanta Pol,,,,,, Urban..

mo Santa la Pólicia , y Urbanidad. Los

=====

Target: Señoritos, que se criaren con estos do-
Prediction: Seoros, se caren est do

Señoritos , que se criáren con estos do-

=====

Target: cumentos, mereceran, quando hombres,
Prediction: cosos,cer,cer,ando,andoomb

cumentos , merecerán , quando hombres

=====

Target: auer nacido Señores. Porque no solo sa-
Prediction: auerac Seores Por no sa

aver nacido Señores. Porque no solo sa-

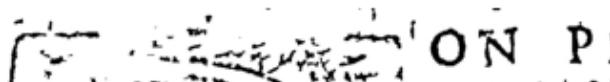
=====

Target: bran ser Caballeros, sino tambien a lo
Prediction: br serall,ino tienien a

bràn ser Caballeros , sino tambien à lo

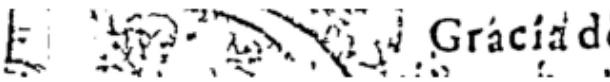
=====

Target: DON PHELIPPE POR LA
Prediction: DONELPE P LA

=====
 DON PHELIPPE POR LA

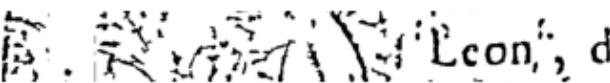
=====

Target: Gracia de Dios, Rey de Castilla, de
Prediction: Gr deios deios Rey Cast,,,,...,illa deilla de

 Gracia de Dios, Rey de Castilla , de

=====

Target: Leon, de Aragon, de las dos Sici-
Prediction: Leon deagon deas Sic-

 Leon , de Aragón , de las dos Sici-

Target: Ilias, de Hierusalem, de Portugal, de
Prediction: I,,, deusalem de.....

 Ilias, de Hierusalem, de Portugal, de

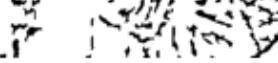
=====

Target: Nauarra, de Granada, de Toledo,
Prediction: Narra, Gran,,,,, deada de.....

 Nauarra, de Granada, de Toledo,

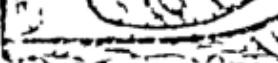
=====

Target: de Ualencia, de Galizia, de Mallorca,
Prediction: deal,,,,,, deiz, deiz, Mallca

 de Valéncia, de Galizia, de Mallorca,

=====

Target: de Seuilla, de Cerdeña, de Cordoua,
Prediction: deu, dedeilla dedeña dedeña deou,

 de Seuilla, de Cerdeña, de Cordoua,

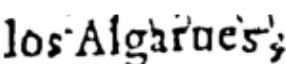
=====

Target: de Corcega, de Murcia, de Jaen, de
Prediction: decega decia, laia, Ja,....., deen,

 de Corcega, de Murcia, de Jaen, de

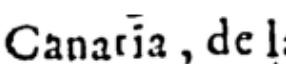
=====

Target: los Algarues, de Algecira, de Gibraltar, de las Islas de
Prediction: losgarues degeira, Gibraltar de Isar, ls deosas

 los Algarues, de Algecira, de Gibraltar, de las Islas de

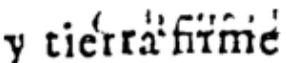
=====

Target: Canaria, de las Indias Orientales, y Occidentales, Islas
Prediction: Can,,, de Ind Orient,,, Occales, Is

 Canaria , de las Indias Orientales , y Occidentales , Islas

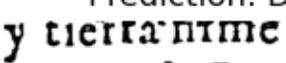
=====

Target: y tierra firme del mar Oceano, Archiduque de Austria,
Prediction: yrarame mar Oano,idque de,.....,idque de,ia

 y tierra firme del mar Oceano ; Archiduque de Austria,

=====

Target: Duque de Borgoña, de Brauante, y Milan, Conde de Abs
Prediction: Du dego, de Bra,....., deuante y,....., Cond Cond de

 y tierra firme aci mar Oceano ; Archiduque de Austria,
Duque de Borgoña, de Brauante y Milan, Conde de Abs

Target: purg, de Flandes, y de Tirol, señor de Uizcaya, y de Mo-
Prediction: p,,, Feses y Ti,or,ñ deor Ucaya y Mo
purg, de Flandes, y de Tirol, señor de Vizcaya , y de Mo-

Target: lina, &c. Por quanto por parte de uos, el Reuerendo in
Prediction: l,,c Poro port pore deos elueo
lina, &c. Pót quanto por parte d' eos, el Reuerendo in

Target: Christo Padre, don Pedro Manso, Obispo de Calahorra,
Prediction: Christ Pad, Pedro Mans,is deorra,
Christò Padre, dñn Pedro Manso, Obispo de Calahorra,

Target: y la Calzada, del nuestro Consejo: nos fue hecha relacion
Prediction: y Calada delestrosejosejojojo nos he rel rel
y la Calçada, del nuestro Ccnsejo : nos fue hecha relación

Target: que en un Synodo que se hauia hecho en la ciudad de Lo-
Prediction: que unodo se haiacho la en cud de Lo de---
que en un Synodo que se hauia hecho en la ciudad de Lo-

Target: grono, de esse Obispado, se hauian hecho algunas Consti-
Prediction: go, es Obado, haian heu he al alasun Const-
grono; de ese Obispado, se hauian hecho algunas Consti-

Target: tuciones Synodales, y reformadas las antiguas, y nos fue
Prediction: tion Synales yales, reform las antu, nos fue
tuciones Synodales, y reformadas las antiguas, y nos fue

Target: pedido, y suplicado os mandasemos dar licencia para que
Prediction: ped, suic osasosos d lic para
pedido, y suplicado os mandasemos dar licécia para que

Target: se imprimiessen las dichas constituciones, y lo pudiesse
Prediction: serimi lasas dich constition, loudse
se imprimiessen las dichas Constituciones, y lo pudiesse

Target: hacer qualquier impresor de estos nuestros Reynos que
Prediction: h qualierorororor deos nurosrosrosososos

hacer qualquier impresor de estos nuestros Reynos que

Target: uos nombrasedes, o como la nuestra merced fuese. Lo
Prediction: u nomased, com laest mer fse.

vos nombráse des, ó como la nuestra merced fuese. Lo

Target: qual uisto por los del nuestro Consejo, y lo pedido cerca
Prediction: qualist por delestrostroestroseestrosejojojo, loidoidoerc ca
qual visto por los del nuestro Consejo, y lo pedido cerca

**Target: stro Fiscal, y la contradizion fecha, por parte de la Pro-
Prediction: stro,,, y contradictioncha pore de Pro**

uincia y hermandades de Alaua, fue acordado que deuia-

Target: mos mandar dar esta nuestra carta en la dicha razon, y
Prediction: mosarararararaaa nurarararaaaaaaaaaaaaaaaa laaaaaaaazon y
mosmandar dar esta nuestra carta en la dicha razon , y

Target: nos tuuimos lo por bien. Por la qual uos damos licencia
Prediction: nosuuos porien Por qual dam dam lic ll lic lic lic lic
nostuuimos lo por bien. Por la qual uos damos licencia

Target: y facultad para que qualquier impressor de estos nuestros
Prediction: yadad para qualierororor est nurosros

y facultad para que qualquier impressor de estos nuestros

=====

Target: Reynos, que uos nombraredes, pueda imprimir las di-
Prediction: Reos, u nraredes pa impirir las di-

Reynos , que vos nombraredes, pueda imprimir las di-

=====

Target: chase Constituciones Synodales, con que despues de im-
Prediction: ch constition Synales, queues im-

chas Constituciones Synodales, con que despues de im-

=====

Target: pressas no se pueda usar de ellas antes que se traygan an-
Prediction: press no pa us us deas ant que tray an-----

pressas no se pueda vſar de ellas antes que se traygan an-

=====

Target: te nos. y se corrijan con el original que ua rubricado y fir-
Prediction: te.os y corjan el quea rubado y-----

te nos. y se corrijan con el original que va rubricado y fir-

=====

Target: mado al fin de ellas de Christoual Nuñez de Leon, nuestro
Prediction: m al deas Christalñ deñ deez de,,,,,,estro

mado al fin de ellas de Christoual Nuñez de Leon, nuestro

=====

Target: escriuano de Camara. de los que residen en el nuestro Con
Prediction: escu darea de que res res en elestro

escriuano de Camara. de los que residen en el nuestro Cō

=====

Target: sejo, y se tasse el precio a que se huiiere de uender cada
Prediction: se, y t elio aio a se hiere deenderada

sejo, y se tasse el precio a que se huiiere de vender cada

Target: pliego de ellas, so pena de caer e incurrir en las penas, con
Prediction: plgo deas soa de c e e e incur incur en pen,

pliego de ellas, so pena de caer e incurrir en las penas, con

=====

Target: tenidas en la pragmatica y leyes de nuestros Reynos, que
Prediction: ten en pragmatic yyes nuros Reyn,

tenidas en la pragmatica y leyes de nuestros Reynos, que

=====

Target: disponen sobre la impression de los libros, y nos agades en
Prediction: disonenbre la deision losros, nos ag,ades eades

disponen sobre la impression de los libros, y no fagades en

=====

Target: de al. De lo qual mandamos dar, y dimos esta nuestra car-
Prediction: de.. De qualam d, dim est nura ca

de al. De lo qual mandamos dar, y dimos esta nuela ca

=====

Target: ta, sellada con nuestro sello, y librada por los de nuestro
Prediction: ta sell conestroooooooooooooo, lada por de nu

ta, sellada con nuestro sello , y librada por los del nuest

=====

Target: Consejo. Dada en la ciudad de Ualladolid, a siete dias del
Prediction: Cjojo D en la cud dealloid, seee di di di di de

Consejo. Dada en la ciudad de Valladolid, a siete dias d

=====

Target: mes de Septiembre, de mil y seyscientos y un años.
Prediction: mes Septbre,,,,,, mil secient y aos unñ.

mes de Septiembre, de mil y seyscientos y vn años.

=====

```
/home/sharvesh/.local/lib/python3.12/site-packages/IPython/core/pylabtools.py:170: UserWarning: Glyph 9 ( ) missing from current font.
  fig.canvas.print_figure(bytes_io, **kw)
```

Target: El Conde de El Licenciado don El Licenciado don Die-
Prediction: Elee deElenci donElenci don don don don don de-

El Conde de El Licenciado don El Licenciado dō Di
Miranda. Juan de Acuña. go Lopez de Ayala

=====

Target: Miranda. Juan de Acuña. go Lopez de Ayala.
Prediction: Mir....Juan Acña go Lopez Ay.

Miranda. Juan de Acuña. go Lopez de Ayala

=====

Target: El Licenciado don el Licenciado don Francisco
Prediction: Elenci donelenenenenenenenenci don

El Licenciado don El Licenciado don Francisco

=====

Target: Juan de Ocon. de Contreras.
Prediction: I decon derereas

Juan de Ocon. de Contreras.

=====

Target: Yo Christoual Nuñez de Leon, escriuano de Camara
Prediction: Yooualn de.....iano deara

Yo Christoual Nuñez de Leon, escriuano de Camara

=====

Target: del Rey nuestro señor, la fize escribir por su mandado, con
Prediction: del nu seor seor laizeribir su mand...

del Rey nuestro señor, la fize escriuir por su mandado, co

=====

Target: acuerdo de los del su Consejo.
Prediction: acdo los susejo

acuerdo de los del su Consejo.

=====

Target: Registrada Jorge de Chanciller Jorge de
Prediction: Regr JorgeAnc Jorge

Registrada Jorge de Chanciller, Jorge de

Target: Olaalde Uergara. □Olaalde Uergara.
Prediction: Oaldeerg.□la Uara.....

Olaalde Vergara.

Olaalde Vergara.

Target: DON Pedro Manso por la gracia de Dios
Prediction: DON Mans Mans por gr deios

ON, Pedro Máſſo por la gracia de Dios

Target: y de la sancta Yglesia de Roma, Obispo
Prediction: y laaaaaaaaaaaa Yles deia Roma Obpo

ON, Pedro Máſſo por la gracia de Dios
y de la sancta Yglesia de Roma, Obispo,

Target: de Calahorra, y la Calzada, del Consejo,
Prediction: deahrarara, laz,ada delseo

de Calahorra, y la Calzada, del Consejo,

Target: de su Magestad, &c. Al dean y Cauil-
Prediction: de Magad &... y yau-

de su Mageſtad, &c. Al Dean y Cauil,

Target: dos de las nuestras sanctas yglesias Ca-
Prediction: dos lasest sanct yles Ca

dos de lasnueſtras ſanctas ygleſias Ca-

Target: thedrales de Calahorra, y la Calzada, y
Prediction: teses deahor, lazada yzada, yzada y

thedrales de Calahorra, y la Calzada, y

Target: Cauildos de las yglesias Collegiales, Ar
Prediction: Cild de yles Collegeseseseses,

Cauildos de las yglesias Collegiales, Ar

Target: ciprestes, Uicarias, Uniuersidades, ygle-
Prediction: crest,icias,ias,ias,iuersides yle

ciprestes, Vicariás, Vniuersidades, ygle;

=====

Target: sias unidas, Cauildos parrochiales, Curas, Beneficiados, y
Prediction: sun,au de deroial, Curiales,asasasasasasas Benefados y
ias unidas, Cauidos de parrochiales, Curas, Beneficiados, y

=====

Target: Clerigos, Mayordomos, Administradores de Cofradias, Her
Prediction: Cig, Mayom,rados Administores deofias Her
Clerigos, Mayordomos, Administradores de Cofradias, Her,

=====

Target: mandades de confrades, y uezindades, e a los Concejos, Seño
Prediction: mand der,,,..., uindes ees e Concejos Se
mandades de confrades, y uezindades, e a los Concejos, Seño

=====

Target: rios, juntas de Prouincias, justicias, quanto a lo espiritual, y
Prediction: ri,unt derouci, justias quant a espual y
ios, juntas de Prouincias, justicias, quanto a lo espiritual, y

=====

Target: otras cualesquier personas Ecclesiasticas, o seglares: y a to-
Prediction: ot ququieron person Eccastic, seasticas ogl:: a-
tras cualesquier personas Ecclesiasticas, o seglares: y a to-

=====

Target: das las yglesias, hospitales, confradias y lugares pios, de todas
Prediction: d las yles,es,esales hospital,rad yares lug pios ded
las las yglesias,hospitales,confradias y lugares pios,de todas,

=====

Target: las ciudades, uillas, y lugares deste nuestro Obispado; y a to-
Prediction: lasiades,illias yares yarese nu Obado y to-
as ciudades,villas, y lugares deste nuestro Obispado, y a to-

Target: dos los demas que de derecho y costumbre, o en otra qual-
Prediction: dos dem que dere yumb, entra----

los los demás que de derecho y costumbre; ó en otra qual-

=====

Target: quier manera soys obligados y os conuiene uenir al Synodo
Prediction: qu man so oblig y conene uir alir Syn

quier manera soys obligados y os conuiene venir al Synodo.

=====

Target: Diocessano: y q os fuere notificado este nuestro mandamien
Prediction: Diess: y osreific esteestrostroestramien

Diocessano: y q os fuere notificado este nuestro mandamien

=====

Target: to en uuestras personas, o en uuestrar yglesias, o como del par
Prediction: to uest person, enurar ylesias oo par

o en vuestras personas, o en vuestras yglesias, o como del par

=====

Target: te supieredes, de manera que no podays pretender ignoran-
Prediction: teieiered, man que noaysaysenderan-

e supieredes, de manera que no podays pretender ignoran-

=====

Target: cia. Salud y bendicion en nuestro Señor Jesu Christo: sabed,
Prediction: cia Sal ycion nu Seor Seoruoooooooooooooooooooooooo

cia. Salud y bendicion en nuestro Señor Jesu Christo : sabed,

=====

Target: que por estar mandado por el sancto Concilio de Trento, que
Prediction: que est mand por sanct Cono Conioioioio Trent,

que por estar mandado por el sancto Concilio de Tréto , que

=====

Target: los Prelados en cada un año hagan Synodo Diocessano, pa-
Prediction: losados c unñoagan Syn Syn Di Diessano pa

los Prelados en cada un año hagan Synodo Diocessano, pa-

Target: ra estatuyr lo qe se dispone en sus decretos, y sacros Canones
Prediction: raatu loe disp en sus de decos,os, sacosos yroso
a estatuyr lo que se dispone en sus decretos, y sacros Canones

Target: nes, hazer justicia, deshazer agrauios, reformar costumbres, ha-
Prediction: nes ha just,h,h ag aguios,ra,iosarios reform costres ha-
nes, hazer justicia, deshazer agrauios, reformar costumbres, ha-

Target: zer constituciones, para que el culto Diuino uaya en augmen-
Prediction: zerucion, que elo Diinou u enmen
zer Constituciones, para que el culto Diuino vaya en augmen-

Target: to, y las haciendas de las Fabricas y obras pias se conseruen, con
Prediction: to y hazi de Fabric Fabric yrás ob p se consuen con
o, y las haziédas de las Fabriqás y obras pías se conseruen, co-

Target: el fauor Diuino hauemos acordado celebrar Synodo en la
Prediction: elau Diinou haem acado celebr Syn en
el fauor Diuino hauemos acordado celebrar Synodo en la

Target: yglesia Collegial de sancta Maria la Redonda de la ciudad de
Prediction: ygiaial dea Maria la la laonda Red de cud de
**el fauor Diuino haemus acordado celebrar Synodo en la
iglesia Collegial de sancta María la Redonda de la ciudad de**

Target: Logroño, y se comenzara a doze dias del mes de Nouiembre
Prediction: Logño, seenz a do di del de Noubre
**Logroño, y se comenza a a doze dias del mes de Noyembre
en razón de lo dicho y descar**

Target: de este presente año de seyscientos, en razon de lo dicho y descar
Prediction: de present a deyisosos, r deazon, r de dich yar
este presente año de seyscientos, en razon de lo dicho y descar

Target: go de nuestra conciencia. Por ende por las presentes y su te-
Prediction: go deest consenciaPde por por present ye-

=====
...o de nuestra conciencia. Por ende por las presentes y su te-
=====

Target: nor os citamos, notificamos y llamamos, y (si necessario es)
Prediction: nor citos, ificos yamos llososos, os, (necess es
=====
nor os citamos, notificamps y llámamos, y (si necessario es)
=====

Target: mandamos en uirtud de sancta obediencia, y so pena de exco
Prediction: mandos uud deaaed obiencia, soaaa ex
=====
mandamos en virtud de sancta obediencia, y so pena de exco
=====

Target: munion, trina, canonica monitione premissa, y cada cien du-
Prediction: mun,ina canon monaition preaaa, c c c c c d du
=====
nunjon, trina, canonica monitione premissa, y cada cien du-
=====

Target: cados, aplicados para obras pias a nuestra disposicion: que uen-
Prediction: c,,, aic pararasrasiasiasias nuraraacion queen
=====
nunjon, trina, canonica monitione premissa, y cada cien du-
=====

Target: gais a os hallar y estar presentes al dicho Synodo (y los Cle-
Prediction: g a hall yararar present present alooodoodoy Cle-
=====
gais a os hallar y estar presentes al dicho Synodo (y los Cle-
=====

Target: rigos con habitos decentes, en bestidos, cabellos, y barba, y
Prediction: rig conososeseseseseseses enidos cabosos yba y
=====
rigos con habitos decentes, en bestidos, cabellos, y barba, y
=====

Target: SEÑOR ILUSTRISSIMO
Prediction: SE♦ ILRIMO

=====
SEÑOR ILVSTRISSIMO.
=====

Target: Ocupado en el exercicio
Prediction: Oado elicio exerc

Cupado en el exercicio

Target: de las Missiones en el
Prediction: de Mission en

de las Missiones en el

Target: Obispado de Guadala-
Prediction: Obado dead-

Obispado de Guadala-

Prediction: x...

Target: xara, recibi una de U.S.I.

xara recibi vna de V.S.I.

Target: en que me da noticia de
Prediction: en me daiciaicia

en que me da noticia de

Target: como su Magestad (que Dios guarde)
Prediction: com suest (D guard)

como su Magestad (que Dio s guarde)

Target: se auia seruido de honrarme con la
Prediction: seiau serido honme con la

se auia servido d honraime con la

Target: merced de su Predicador; y como no
Prediction: mer de Predador; com no

merced de su Predicador; y como no

Target: se opone la predicacion de su Mageſ.
Prediction: seone predic de Mages

se opone la predicacion de su Mageſ.

=====

Target: tad a la Apostolica, tuue por de mi obli
Prediction: t a Apostica tu por mili

tad a la Apostolica, tuve por de mi obli

=====

Target: gacion admitir el fauor, rindiendo a
Prediction: g admit elau,indendo a

gacion admitir el favor, rindiendo a

=====

Target: U.S.I. el agradecimiento.
Prediction: USI elradeimooo

V.S.I. el agradecimiento

=====

Target: El Rey mi señor (que Dios guarde)
Prediction: El miñ (D guard)

El Rey mi señor (que Dios guarde)

=====

Target: hizo la gracia; mas a U.S.I. se le debe:
Prediction: h la gr;;; a..... debe

hizo la gracia ; mas a V.S.I. se le debe:

=====

Target: que por mas frutos, que diera la tierra
Prediction: que masososososos, d lara tier

que por mis frutos, que diera la tierra

=====

Target: de Promission, no los lograra Moyses,
Prediction: deission no logarases

de Promission , no los lograra Moyses,

Target: si Josue, y Caleb no los sacassen. Dos
Prediction: siue, Caleb losass.

si Josue, y Caleb no los sacassen. Dos

=====

Target: sacaron el fruto, y de ambos necessito,
Prediction: sac eluto y amb necessito

sacaron el fruto, y de ambos necessito,

=====

Target: para hallar un simil proporcionado a la
Prediction: par hall unilporporcado la

para hallar vn simil j i oj orcionando a la

=====

Target: grandeza de U.S.I.
Prediction: grandza de.....

grandeza de V.S.I.

=====

Target: A estos dos nombres dan misterio-
Prediction: Aos dosomb dan mio-

A estos dos nombres d' n misterio-

=====

Target: sas interpretaciones los Sagrados In-
Prediction: s interpretes losrad In

sas interpretaciones los Sagrados In-

=====

Target: terpretes. A Caleb le llaman Quasi cor,
Prediction: tereses A le le le II Qu cori.....

terpretes. A Caleb le llaman Quasi cor,

=====

Target: y a Josue Dominus Saluator; Corazon, Señor,
Prediction: y Jos Domin Salatoru;azon Seor,ñ,ñ,ñ,

y a Josue Dominus Saluator; Corazon, Señor,

Target: y Salvador. Y todos tres significados se
Prediction: yuador Ydos t t t tres signific se

y Salvador. Y todos tres significados se

=====

Target: hallan en U.I. siendo en el ministerio
Prediction: hall en.....endo elio minister

hallan en V. I. siendo en el ministerio

=====

Target: de patriarca el Aaron de Palacio, el Sa-
Prediction: dearca el de de de Pal,,,,,,o el--

de Patriarca el Aaron de Palacio, el Sa-

=====

Target: cerdote grande de la Casa Real, en cu-
Prediction: ceroteeeeeee de de Cas Real en--

cerdote gran le d la Casa Real, en cu-

=====

Target: yo pecho m ejor, que en el racionil, se
Prediction: yocho mej,,,,, en elional se

yo pecho mejor, que en el racionil, se

=====

Target: lee Uerdad y Doctrina, para que como en
Prediction: leeerd yrina, Doct,,,,,, queo en

lee Verdad,y Doctrina, para que como en

=====

Target: animado Pectoral de discreciones, des-
Prediction: anim Poral discion, discion,-

animado Pectoral de discreciones, des

=====

Target: canse el corazon de su Magestad.
Prediction: can elazon suest.

canse el corazon de su Magestad.

Target: Es tambien U.I. Corazon, Señor, y Salua-
Prediction: Esamb UI Cor,ñ Seor yua-

Es tambien V.I. (, r , , Señor, y Salua-

=====

Target: dor de toda la Christandad en los Rey-
Prediction: dor toda Christad en Rey

d r de to dili Christundad en los Rey-

=====

Target: nos de España, peus por su ministerio,
Prediction: nos Espña,us por minister,

nos de España, p ues por su ministerio,

=====

Target: a imitacion del corazon, da uida espiri-
Prediction: ait delazonazonazon cor....., laidapir-

a imitacion del corazon, di vi li el spiri-

=====

Target: tual a las almas para que se saluen, re-
Prediction: t a al al para que salen re-

tual a lis almis para qu . se salven , re-

=====

Target: partiendo la Bula de la Santa Cruzada
Prediction: partendo B de la la la Santaada

partiendo la Bula de la Santa Cruzada

=====

Target: a los fieles.
Prediction: a fesiel.

a los fieles.

=====

Target: Los primeros Comissarios de Cru-
Prediction: Loseros Comarios Cru

Los pri neros Comissarios de Cru-

Target: zada, que huuo, fueron Josue, y Caleb
Prediction: z,,, queuu,er Jos,ue y

zada, qui · huuo, fueron Josue, y Caleb

=====

Target: (no es arrojo de Predicador, sino inte-
Prediction: (esro deic,,.....,ino

(no es arrojo de Predicidor, sino inte-

=====

Target: ligencia de Escripturario) pues en un
Prediction: lig descriptario p en

ligencia de Escripturario) pues en un

=====

Target: leño a el ombro sacaron el razimo de
Prediction: le a oro sac elaz de

leño a el ombro sacaron el razimo de

=====

Target: la tierra de Promission, sombra, y figura
Prediction: lararara Prom, aomb,,,..., fig

la tierra de Promissio i sombra, y figura

=====

Target: de Jesu Christo nuestro Redemptor,
Prediction: deuooestrostroestrostroestrostroempt Redoror

de Jesu Christo nuestro Redemptor,

=====

Target: pendiente del Sacrosanto Arbol, en
Prediction: pende delros Ar,,.....,

pendiente del Sacrosanto Aibol, en

=====

Target: cuya uirtud se nos perdonan las cul-
Prediction: cu uud se perdon las-----

cuya virtud se nos perdonan las cul-

Target: pas: esso es Bula, y porque todo nace
Prediction: pas ess esula yquedoace

pas:esso es Bula , y porque todo nace

=====

Target: de aquella preciosissima Sangre derra-
Prediction: deellaciissimarerere der der-

de aquella preciosissima Sangre derra-

=====

Target: mada en la Cruz, se llama Bula de la
Prediction: m en Cruz seamaula de

mada en la Cruz , se llama Bula de la

=====

Target: Santa Cruzada. Josue, y Caleb la sa-
Prediction: Santaadaada Jos,,,., Caleb sa-

Santa Cruzada. Josue , y Caleb la sa-

=====

Target: caron, y la publicaron a el pueblo; y a
Prediction: car, laaron a poo;;;;

caron, y la publicaron a el pueblo ; y a

=====

Target: no ser incredulos huvieran entrado to-
Prediction: no incredos hier entr entr to

no ser incredulos huvieran entrado to-

=====

Target: dos en la tierra de Promission.
Prediction: dos lararara deission

dos en la tierra de Promission.

=====

Target: No acaso llamo el Sacro Texto
Prediction: Noas ll el el Sac Sac Text

No acaso llamo el Sacro Texto

Target: Cerrojo (quem portauerunt in ueste) a el leño

Prediction: Cro (emauer inect a le

Cerrojo (quem portauerunt in ueste) a el leño

=====

Target: en quien pendia el razimo; porque si

Prediction: enien pend elaz;que

en quien pendia el razimo ; porque si

=====

Target: quitados los cerrojos se abren las puer

Prediction: quit losroos sej seren p

quitados los cerrojos se abren las puer

=====

Target: tas, por aquell razimo pendiente se fran-

Prediction: t, porelaz pende fr-----

tas, por aquell razimo pendiente se frá-

=====

Target: queaba la entrada a la tierra de Promis-

Prediction: que laadaadaada larara dera deis

queaba la entrada a la tierra de Promis-

=====

Target: sion. Que es distribuir la bula, sino fa-

Prediction: s..... esribir b,,,,,,,,,, fin fa-

sion. Que es distribuir la Bula, sino fa-

=====

Target: cilitar la entrada a la Bienauenturanza?

Prediction: cil laadaada laienentanza Bauuranza

cilitar la entrada a la Bienaventurança?

=====

Target: En esta desseo uer a U.S.I. y todo lo

Prediction: Enaaseoer a..... to lo

En esta desseo ver a V.S.I. y todo lo

Target: que no es esto, es nada. Y si a Josue, y
Prediction: que esoo est, n..... a Jos,

que no es esto, es nada. Y si a Josue, y

=====

Target: Caleb su fe los introduxo en la tierra,
Prediction: C su losxuxo lararara,

Caleb su fe los introduxo en la tierra,

=====

Target: AL IIIUUSTRISSIMO SEÑOR
Prediction: ALURIM SE♦

AL ILLVSTRISSIMO SEÑOR

=====

Target: DON ALONSO PEREZ
Prediction: DONON PZ

DON ALONSO PEREZ

=====

Target: DE GUZMAN EL BUENO,
Prediction: DEZ ELENENENENENO

DE GVZMAN EL BVENO,

=====

Target: PATRIARCHA DE LAS INDIAS
Prediction: PRIARCH DEASDI

PATRIARCHA DE LAS INDIAS

=====

Target: Arzobispo de Tyro, Limosnero mayor del Rey
Prediction: Arobpo Ty,o Limner mayor Rey

Arzobispo de Tyro, Limosnero mayor del Rey

=====

Target: Nuestro Señor Don Felipe IU. El Grande Rey de
Prediction: Nestroñ Donipe IU El Rey

Nuestro Señor Don Felipe IV. el Grande Rey de

Target: las Españas, del Consejo de su Magestad, y Iuez
Prediction: lasaas delsejo suest, l

las Españas , del Consejo de su Magestad , y Iuez

=====

Target: Eclesiastico Ordinario de su Real Capilla, Casa,
Prediction: Eiastic Ordario su Cap,,,a

Eclesiastico Ordinario de su Real Capilla, Casa

=====

Target: y Corte.
Prediction: ye.e

y Corte.

=====

Target: SEGUNDA uez, (Illustrissimo Señor) Salen de
Prediction: SEUN u..... (ustissimoñ)en de de de de de de

 *EGVNDA vez, (Illustrissimo Señor) salen d*

=====

Target: la estampa estos Documentos Politicos, y Morales
Prediction: laampaosososososososic, Morales

 *la estampa estos Documentos Politicos, y Morales*

=====

Target: para formar un Principe perfecto, y Ministros aju-
Prediction: par form unci perfect, Minrosju a--

 *para formarvn Principe perfecto , y Ministros aju*

=====

Target: stados, por auerse despachado en tiempo breue la Im-
Prediction: st,,, ase despado tpo bre la-----

 *stados , por auerse despachado en tiempo breue la Im*

=====

Target: presion primera. Helos añadido de nuevo, y exornado
Prediction: pres prim.os aidos dead deue, exado yorn

 *presion primera. Helos añadido de nuevo , y exornad*

Target: con estampas de Emblemas, que con mas halago de los ojos pongan a
Prediction: conamp debleas que masago losj p p p p pan

on estampas de Emblemas , que con mas halago de los ojos pongan

=====

Target: la uista las enseñanzas. Consagre a la Magestad Catolica de nuestro
Prediction: laista enñanz.agrerere a Mag a Magadolica nu

ar vista las enseñanzas. Consagrè à la Magestad Catolica de nuestro

=====

Target: Monarca la primera uez este libro, y para que buelua mejorado a sus
Prediction: Mona laeraez este lib, para paraelelel mejuajado susor a

Monarca la primera vez este libro, y para que buelua mejorado à su

=====

Target: Reales manos, le pongo en las U.S.I. de quien le admitira con los
Prediction: Re man, p en en las..... qu leien admit con

Reales manos , le pongo en las de V. S. I. de quien le admitira con lo

=====

Target: agrados, que tienen a su Magestad merecidos sus grandes, y conti-
Prediction: agos, ten a Magad mereid grand suses, cont-

igrados , que tienen à su Magestad merecidos sus grandes , y conti-

=====

Target: nuados Seruicios. Como si no uuiera U.S.I. heredado de sus excellenti-
Prediction: nu Seric.o no uiera.....red deiendoi---i-

nuados seruicios. Como si no vuiera V.S. I. heredado de sus excellenti-

=====

Target: simos Progenitores ser Guzman el Bueno, con sus acciones ha gran-
Prediction: sim Proit serzman serzman Buo, susion ha----

simos Progenitores ser Guzman el Bueno , con sus acciones ha gran-

=====

Target: geado el serlo; logrando dignamente en nuestro Monarcha la gracia:
Prediction: ge ello logo logo dign digneeeeeee enestroaaa laacia

geado el serlo ; logrando dignamente en nuestro Monarcha la graci.

=====

Target: en su Corte el cariño: en el Orbe todo la estimacion, y la fama en la
Prediction: en Cort eli: eli: el Or to tododo laacion y fam en

en su Corte el cariño : en el Orbe todo la estimacion , y la fama en l

Target: posteridad. El que es comun amparo, no se negara a serlo desta Obra:
Prediction: pidad. que com am amo no neg ao ser dest Ob:

osteridad. El que es comun amparo, no se negará à serlo desta Obr.

=====

Target: calificandola con leerla: honrandola con admitirla: y patrocinandola
Prediction: calandola lela hon:rand conirl: admita yrocandola

alificandola con leerla : honrandola con admitirla : y patrocinandol

=====

Target: con repetir en nombre de su Autor a su Magestad este obsequio, que
Prediction: conir nrere duor a Magad este queio,

on repetir en nombre de su Autor à su Magestad este obsequio , qu

=====

```
KeyboardInterrupt                                     Traceback (most recent call last)
Cell In[17], line 77
    74 texts = df['text'].tolist()
    75 # Run evaluation
--> 77 evaluate_model(line_images, texts, target_size=(256, 64), batch_size
=2)

Cell In[17], line 31, in evaluate_model(line_images, texts, target_size, bat
ch_size)
    29 for batch in dataloader:
    30     pixel_values = batch["pixel_values"].to(device)
--> 31     generated_ids = model.generate(pixel_values)
    32     generated_texts = processor.tokenizer.batch_decode(generated_id
s, skip_special_tokens=True)
    34     for i, pred in enumerate(generated_texts):

File ~/.local/lib/python3.12/site-packages/torch/utils/_contextlib.py:116, i
n context_decorator.<locals>.decorate_context(*args, **kwargs)
    113 @functools.wraps(func)
    114 def decorate_context(*args, **kwargs):
    115     with ctx_factory():
--> 116         return func(*args, **kwargs)

File ~/.local/lib/python3.12/site-packages/transformers/generation/utils.py:
2326, in GenerationMixin.generate(self, inputs, generation_config, logits_pr
ocessor, stopping_criteria, prefix_allowed_tokens_fn, synced_gpus, assistant
_model, streamer, negative_prompt_ids, negative_prompt_attention_mask, use_m
odel_defaults, **kwargs)
    2318     input_ids, model_kwargs = self._expand_inputs_for_generation(
    2319         input_ids=input_ids,
    2320         expand_size=generation_config.num_return_sequences,
    2321         is_encoder_decoder=self.config.is_encoder_decoder,
    2322         **model_kwargs,
    2323     )
    2325     # 12. run sample (it degenerates to greedy search when `generati
on_config.do_sample=False`)
-> 2326     result = self._sample(
    2327         input_ids,
    2328         logits_processor=prepared_logits_processor,
    2329         stopping_criteria=prepared_stopping_criteria,
    2330         generation_config=generation_config,
    2331         synced_gpus=synced_gpus,
    2332         streamer=streamer,
    2333         **model_kwargs,
    2334     )
2336 elif generation_mode in (GenerationMode.BEAM_SAMPLE, GenerationMode.
BEAM_SEARCH):
    2337     # 11. interleave input_ids with `num_beams` additional sequences
per batch
    2338     input_ids, model_kwargs = self._expand_inputs_for_generation(
    2339         input_ids=input_ids,
    2340         expand_size=generation_config.num_beams,
    2341         is_encoder_decoder=self.config.is_encoder_decoder,
    2342         **model_kwargs,
    2343     )
```

```

File ~/.local/lib/python3.12/site-packages/transformers/generation/utils.py:
3292, in GenerationMixin._sample(self, input_ids, logits_processor, stopping_
_criteria, generation_config, synced_gpus, streamer, **model_kwargs)
    3289     outputs = model_forward(**model_inputs, return_dict=True)
    3291 # synced_gpus: don't waste resources running the code we don't need;
  kwargs must be updated before skipping
-> 3292     model_kwargs = self._update_model_kwargs_for_generation(
    3293         outputs,
    3294         model_kwargs,
    3295         is_encoder_decoder=self.config.is_encoder_decoder,
    3296     )
    3297 if synced_gpus and this_peer_finished:
    3298     continue

File ~/.local/lib/python3.12/site-packages/transformers/generation/utils.py:
833, in GenerationMixin._update_model_kwargs_for_generation(self, outputs, m
odel_kwargs, is_encoder_decoder, num_new_tokens)
    831 else:
    832     past_positions = model_kwargs.pop("cache_position")
--> 833     new_positions = torch.arange(
    834         past_positions[-1] + 1, past_positions[-1] + num_new_tokens
+ 1, dtype=past_positions.dtype
    835     ).to(past_positions.device)
    836     model_kwargs["cache_position"] = torch.cat((past_positions, new_
positions))
    837 return model_kwargs

```

KeyboardInterrupt:

```

In [2]: import pandas as pd
import albumentations as A
import torch
from torch.utils.data import Dataset, DataLoader, random_split
from transformers import TrOCRProcessor, VisionEncoderDecoderModel, Trainer,
from PIL import Image
import numpy as np
from torch.nn.utils.rnn import pad_sequence
from torch.optim import AdamW
from torch.optim.lr_scheduler import ReduceLROnPlateau
import evaluate # Updated for metrics
import os

# Load CER and WER metrics
cer_metric = evaluate.load("cer")
wer_metric = evaluate.load("wer")

# Define compute_metrics function
def compute_metrics(eval_pred):
    logits, labels = eval_pred
    if isinstance(logits, tuple):
        logits = logits[0]
    predictions = logits.argmax(-1)
    decoded_preds = processor.tokenizer.batch_decode(predictions, skip_speci
decoded_labels = []
    for label in labels:

```

```

        label_filtered = [token for token in label if token != -100]
        decoded_label = processor.tokenizer.decode(label_filtered, skip_special_tokens=True)
        decoded_labels.append(decoded_label)
    cer_score = cer_metric.compute(predictions=decoded_preds, references=decoded_labels)
    wer_score = wer_metric.compute(predictions=decoded_preds, references=decoded_labels)
    return {"cer": cer_score, "wer": wer_score}

# Custom Dataset class (unchanged)
class LineDataset(Dataset):
    def __init__(self, processor, model, line_images, texts, target_size=(256, 256)):
        self.line_images = line_images
        self.texts = texts
        self.processor = processor
        self.processor.image_processor.max_length = max_length
        self.processor.tokenizer.model_max_length = max_length
        self.model = model
        self.model.config.max_length = max_length
        self.target_size = target_size
        self.max_length = max_length
        self.apply_augmentation = apply_augmentation
        if apply_augmentation:
            self.transform = A.Compose([
                A.OneOf([
                    A.Rotate(limit=2, p=1.0),
                    A.GaussNoise(var_limit=(5.0, 10.0), p=1.0),
                    A.GaussianBlur(blur_limit=(3, 5), p=1.0),
                    A.RandomBrightnessContrast(brightness_limit=0.1, contrast_limit=0.1, p=1.0),
                    A.OpticalDistortion(distort_limit=0.02, shift_limit=0.02, p=1.0),
                ], p=0.8),
            ])
        else:
            self.transform = A.Compose([])
        print("Applied augmentation!")

    def __len__(self):
        return len(self.line_images)

    def __getitem__(self, idx):
        image = self.line_images[idx]
        text = self.texts[idx]
        if isinstance(image, str):
            image = Image.open(image).convert("RGB")
        elif isinstance(image, np.ndarray):
            image = Image.fromarray(image).convert("RGB")
        image = np.array(image)
        if self.apply_augmentation:
            augmented = self.transform(image=image)
            image = augmented['image']
        image = Image.fromarray(image).resize(self.target_size, Image.BILINEAR)
        image = np.array(image) / 255.0
        image = np.transpose(image, (2, 0, 1))
        encoding = self.processor(images=image, text=text, return_tensors="pt")
        encoding['labels'] = encoding['labels'][:, :self.max_length]
        return {k: v.squeeze() for k, v in encoding.items()}

# Collate function

```

```

def collate_fn(batch):
    pixel_values = torch.stack([item['pixel_values'] for item in batch])
    labels = pad_sequence([item['labels'] for item in batch], batch_first=True)
    return {'pixel_values': pixel_values, 'labels': labels}

# Training function for the fine-tuned model
def continue_training_finetuned_model(line_images, texts, target_size=(256,
    print("Inside continue training function!")
    device = torch.device("cpu") # Adjust to "cuda" if GPU available

    # Load the fine-tuned model and processor
    global processor
    save_dir = "/media/sharvesh/Expansion/Documents/model/finetuned_trocr_sp"
    processor = TrOCRProcessor.from_pretrained(save_dir, do_rescale=False)
    model = VisionEncoderDecoderModel.from_pretrained(save_dir).to(device)

    # Load or define generation config
    generation_config = GenerationConfig(max_length=512, no_repeat_ngram_size=2)

    # Create dataset (use same or new data)
    dataset = LineDataset(processor, model, line_images, texts, target_size,
        val_size = int(len(dataset) * val_split)
        train_size = len(dataset) - val_size
        train_dataset, val_dataset = random_split(dataset, [train_size, val_size])

        print(f"Training dataset size: {len(train_dataset)}")
        print(f"Validation dataset size: {len(val_dataset)}")

    # Define training arguments for continued training
    training_args = TrainingArguments(
        output_dir="/media/sharvesh/Expansion/Documents/model/results_continued",
        num_train_epochs=5, # Fewer epochs for additional training (adjust as needed)
        per_device_train_batch_size=batch_size,
        per_device_eval_batch_size=batch_size,
        logging_dir=".//logs_continued_v2",
        logging_steps=20, # More frequent logging
        save_steps=100,
        save_total_limit=2,
        evaluation_strategy="steps",
        eval_steps=20,
        learning_rate=1e-5, # Lower learning rate for fine-tuning
        weight_decay=0.01,
        load_best_model_at_end=True,
        metric_for_best_model="cer",
        greater_is_better=False,
        gradient_accumulation_steps=16,
        fp16=False, # Set to True if using GPU with CUDA
        use_cpu=True, # Set to False if using GPU
        logging_first_step=True,
    )

    # Define optimizer and scheduler
    optimizer = AdamW(model.parameters(), lr=training_args.learning_rate, weight_decay=0.01)
    scheduler = ReduceLROnPlateau(optimizer, mode='min', factor=0.1, patience=3)

    # Initialize trainer

```

```
trainer = Trainer(
    model=model,
    args=training_args,
    train_dataset=train_dataset,
    eval_dataset=val_dataset,
    data_collator=collate_fn,
    optimizers=(optimizer, scheduler),
    callbacks=[EarlyStoppingCallback(early_stopping_patience=5)],
    compute_metrics=compute_metrics
)

# Continue training
trainer.train()

# Save the updated fine-tuned model
updated_save_dir = "/media/sharvesh/Expansion/Documents/model/finetuned"
os.makedirs(updated_save_dir, exist_ok=True)
model.save_pretrained(updated_save_dir)
processor.save_pretrained(updated_save_dir)
print(f"Updated model saved to {updated_save_dir}")

# Load your CSV file and prepare data
csv_file = "/home/sharvesh/Documents/Others/Human_AI/Model/data/output/datas
df = pd.read_csv(csv_file)

# Assuming columns 'image_path' and 'text' (updated from 'ground_truth')
line_images = df['image_path'].tolist()
texts = df['text'].tolist()

# Continue training the fine-tuned model
continue_training_finetuned_model(line_images, texts, target_size=(256, 64),
```

```
/home/sharvesh/.local/lib/python3.12/site-packages/albumentations/__init__.py:24: UserWarning: A new version of Albumentations is available: 2.0.5 (you have 1.4.21). Upgrade using: pip install -U albumentations. To disable automatic update checks, set the environment variable NO_ALBUMENTATIONS_UPDATE to 1.
    check_for_updates()
2025-04-01 13:41:19.605132: I tensorflow/core/util/port.cc:153] oneDNN custom operations are on. You may see slightly different numerical results due to floating-point round-off errors from different computation orders. To turn them off, set the environment variable `TF_ENABLE_ONEDNN_OPTS=0`.
2025-04-01 13:41:19.701431: E external/local_xla/xla/stream_executor/cuda/cu_dnn_fft.cc:467] Unable to register cuFFT factory: Attempting to register factory for plugin cuFFT when one has already been registered
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
E0000 00:00:1743495079.739900    8454 cuda_dnn.cc:8579] Unable to register cuDNN factory: Attempting to register factory for plugin cuDNN when one has already been registered
E0000 00:00:1743495079.749720    8454 cuda_blas.cc:1407] Unable to register cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has already been registered
W0000 00:00:1743495079.833336    8454 computation_placer.cc:177] computation placer already registered. Please check linkage and avoid linking the same target more than once.
W0000 00:00:1743495079.833353    8454 computation_placer.cc:177] computation placer already registered. Please check linkage and avoid linking the same target more than once.
W0000 00:00:1743495079.833356    8454 computation_placer.cc:177] computation placer already registered. Please check linkage and avoid linking the same target more than once.
W0000 00:00:1743495079.833357    8454 computation_placer.cc:177] computation placer already registered. Please check linkage and avoid linking the same target more than once.
2025-04-01 13:41:19.843954: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.
To enable the following instructions: AVX2 AVX_VNNI FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
```

Inside continue training function!

Using a slow image processor as `use_fast` is unset and a slow processor was saved with this model. `use_fast=True` will be the default behavior in v4.5.0, even if the model was saved with a slow processor. This will result in minor differences in outputs. You'll still be able to use a slow processor with `use_fast=False`.

```
Config of the encoder: <class 'transformers.models.vit.modeling_vit.ViTModel'> is overwritten by shared encoder config: ViTConfig {
    "attention_probs_dropout_prob": 0.0,
    "encoder_stride": 16,
    "hidden_act": "gelu",
    "hidden_dropout_prob": 0.0,
    "hidden_size": 1024,
    "image_size": 384,
    "initializer_range": 0.02,
    "intermediate_size": 4096,
    "layer_norm_eps": 1e-12,
    "model_type": "vit",
    "num_attention_heads": 16,
    "num_channels": 3,
    "num_hidden_layers": 24,
    "patch_size": 16,
    "pooler_act": "tanh",
    "pooler_output_size": 1024,
    "qkv_bias": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1"
}
```

Config of the decoder: <class 'transformers.models.trocr.modeling_trocr.Tr0CRForCausalLM'> is overwritten by shared decoder config: Tr0CRConfig {

```
    "activation_dropout": 0.0,
    "activation_function": "relu",
    "add_cross_attention": true,
    "attention_dropout": 0.0,
    "bos_token_id": 0,
    "classifier_dropout": 0.0,
    "d_model": 1024,
    "decoder_attention_heads": 16,
    "decoder_ffn_dim": 4096,
    "decoder_layerdrop": 0.0,
    "decoder_layers": 12,
    "decoder_start_token_id": 2,
    "dropout": 0.1,
    "encoder_hidden_size": 1024,
    "eos_token_id": 2,
    "init_std": 0.02,
    "is_decoder": true,
    "layernorm_embedding": false,
    "max_position_embeddings": 1024,
    "model_type": "trocr",
    "pad_token_id": 1,
    "scale_embedding": true,
    "tie_word_embeddings": false,
    "torch_dtype": "float32",
    "transformers_version": "4.50.1",
    "use_cache": false,
```

```
        "use_learned_position_embeddings": false,  
        "vocab_size": 50265  
    }  
  
Applied augmentation!
```

```
Training dataset size: 528  
Validation dataset size: 58
```

```
/home/sharvesh/.local/lib/python3.12/site-packages/transformers/training_args.py:1611: FutureWarning: `evaluation_strategy` is deprecated and will be removed in version 4.46 of 🤗 Transformers. Use `eval_strategy` instead  
    warnings.warn(
```

```
wandb: WARNING The `run_name` is currently set to the same value as `TrainingArguments.output_dir`. If this was not intended, please specify a different run name by setting the `TrainingArguments.run_name` parameter.
```

```
wandb: Using wandb-core as the SDK backend. Please refer to https://wandb.me/wandb-core for more information.
```

```
wandb: Currently logged in as: sreesharvesh2709 (sreesharvesh2709-amrita-vishwa-vidyapeetham) to https://api.wandb.ai. Use `wandb login --relogin` to force relogin
```

```
Tracking run with wandb version 0.19.8
```

```
Run data is saved locally in
```

```
/home/sharvesh/Documents/0thers/Human_AI/Model/wandb/run-20250401_134207-o59w0zbt
```

```
Syncing run
```

/media/sharvesh/Expansion/Documents/model/results_continued_v3 to
[Weights & Biases \(docs\)](#)

View project at <https://wandb.ai/sreesharvesh2709-amrita-vishwa-vidyapeetham/huggingface>

View run at <https://wandb.ai/sreesharvesh2709-amrita-vishwa-vidyapeetham/huggingface/runs/o59w0zbt>

```
`loss_type=None` was set in the config but it is unrecognised. Using the default loss: `ForCausalLMLoss`.
```

[80/80 3:05:09, Epoch 4/5]

Step	Training Loss	Validation Loss	Cer	Wer
20	0.056600	0.060328	0.006397	0.021073
40	0.051600	0.064336	0.008884	0.030651
60	0.048300	0.051742	0.010661	0.022989
80	0.054900	0.072586	0.010661	0.026820

```
/home/sharvesh/.local/lib/python3.12/site-packages/transformers/modeling_utils.py:3353: UserWarning: Moving the following attributes in the config to the generation config: {'max_length': 512}. You are seeing this warning because you've set generation parameters in the model config, as opposed to in the generation config.  
    warnings.warn(
```

```
Updated model saved to /media/sharvesh/Expansion/Documents/model/finetuned_trocr_spanish_historical_v4
```

```
In [ ]: import torch
from torch.utils.data import DataLoader
import matplotlib.pyplot as plt
from jiwer import cer, wer
from PIL import Image
import numpy as np
import os

# Function to evaluate the trained model
def evaluate_model(line_images, texts, target_size=(256, 64), batch_size=2):
    device = torch.device("cuda" if torch.cuda.is_available() else "cpu")

    # Define model and processor paths (update paths accordingly)
    model_path = "/media/sharvesh/Expansion/Documents/model/finetuned_trocr_processor_path = model_path

    processor = TrOCRProcessor.from_pretrained(processor_path)
    model = VisionEncoderDecoderModel.from_pretrained(model_path).to(device)
    model.eval()

    dataset = LineDataset(processor, model, line_images, texts, target_size,
    dataloader = DataLoader(dataset, batch_size=batch_size, shuffle=False, c

    cer_scores = []
    wer_scores = []
    predictions = []

    with torch.no_grad():
        for batch in dataloader:
            pixel_values = batch["pixel_values"].to(device)
            generated_ids = model.generate(pixel_values)
            generated_texts = processor.tokenizer.batch_decode(generated_ids)

            for i, pred in enumerate(generated_texts):
                gt = texts[len(predictions)] # Ground truth

                # Compute CER and WER
                cer_scores.append(cer(gt, pred))
                wer_scores.append(wer(gt, pred))

                predictions.append(pred)

            # Display image and predictions
            image_path = line_images[len(predictions) - 1]
            if isinstance(image_path, str):
                image = Image.open(image_path).convert("L")
            else:
                image = Image.fromarray(image_path).convert("L")

            plt.figure(figsize=(8, 6))
            plt.imshow(image, cmap='gray')
            plt.title(f"Target: {gt}\nPrediction: {pred}")
            plt.axis('off')
            plt.show()
            print("=" * 50)
```

```
# Compute average scores
avg_cer = sum(cer_scores) / len(cer_scores) if cer_scores else 0
avg_wer = sum(wer_scores) / len(wer_scores) if wer_scores else 0

print(f"Average CER: {avg_cer:.4f}")
print(f"Average WER: {avg_wer:.4f}")
print("Evaluation completed.")

# Print all predictions
for i, pred in enumerate(predictions):
    print(f"{i+1}: {pred}")

# Load your CSV file
csv_file = "/home/sharvesh/Documents/Others/Human_AI/Model/data/output/datas
df = pd.read_csv(csv_file)

line_images = df['image_path'].tolist()
texts = df['text'].tolist()

# Run evaluation
evaluate_model(line_images, texts, target_size=(256, 64), batch_size=2)
```

In []:

This notebook was converted with [convert.ploomber.io](#)